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FACULTY OF EDUCATION
The University of Alberta

The Alberta Journal of Educational Research *Vol. XXVII, No. 3, September, 1981, 211-216*

GRAHAM HURLBURT
The University of Manitoba

Psychoticism, Teacher Appraisal, and Life Styles of a Canadian High School Sample

Data were gathered from a medium sized high school in the middle class suburb of a western Canadian city. Using the Eysenck Personality Questionnaire, teacher appraisal, and life style questionnaire, the study found significant differences ($p<.05$) between high and low psychoticism scorers on teacher appraisal, alcohol consumption, cigarette smoking, marijuana smoking, and sex of student; no significant differences ($p<.05$) were found between high and low psychoticism scorers on TV viewing and residence with one or both parents.

The bane of countless generations of school teachers has been the uncooperative, restless, disruptive student. Tales of woe by weary pedagogues relate to classroom lessons being subverted by the antics of an antisocial few. The emotionally disturbed and the hyperactive student can conspire to interrupt the educational process in the classrooms of high schools.

Is classroom and out-of-school behaviour related to high psychoticism? What are the characteristics of the high psychoticism scorer? Eysenck and Eysenck (1975) studied 540 males and 590 females between 16 and 19 years of age using the Eysenck Personality Questionnaire. They found that high psychoticism scorers were solitary, not caring for people and were often cruel and inhumane, lacking in feeling and empathy, and altogether insensitive. They were hostile to others, even to family and peers, and aggressive, even to loved ones. They had a liking for odd and unusual things, and a disregard for danger; they liked to make fools of other people and to upset them.

Eysenck and Eysenck concluded that high school aged high psychoticism scorers made up for lack of feelings by indulging in sensation-seeking "arousal jags" without thinking of the dangers involved. Socialization was a concept relatively alien to them, as were empathy, guilt, and sensitivity to others. This description, of course, referred in its entirety only to extreme examples; persons scoring relatively high, but nearer the middle range of scores, were represented

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more frequently than extremes, and would only show these behaviour patterns to a much less highly developed degree.

Certain previous studies on high school populations using the Eysenck Personality Questionnaire indicate psychoticism is related to antisocial behaviour. Saklofske (1977) studied four groups of 20 adolescent boys on the basis of self-report ratings of antisocial behaviour, teacher's ratings of classroom misbehaviour, and the administration of the EPQ. Significant differences on Eysenck's psychoticism scale were obtained between both high versus low antisocial behaviour groups and well behaved versus badly behaved teacher-rated groups. Extraversion and psychoticism scales discriminated between students scoring high and low on an objective measure of school naughtiness. Subjects rated by teachers as badly behaved obtained significantly higher psychoticism scores ($\bar{x}=7.78$) than their well behaved peers ($\bar{x}=6.08$). Also, boys high in antisocial behaviour scored significantly higher on the psychoticism scale ($\bar{x}=9.33$) than did boys low in antisocial behaviour ($\bar{x}=4.53$). Eysenck's theory, that degree of psychoticism is capable of predicting misbehaviour engaged in by adolescent boys, was supported.

That there are national differences in psychoticism levels of students is indicated by some studies. Eysenck, Adelaja and Eysenck (1977) studied 329 male and 101 female Nigerians, and 404 male and 544 female British students to compare the two groups. Using the EPQ, they found that the Nigerians had a much higher psychoticism score, females had a much lower psychoticism score in both British and Nigerian populations, and Nigerian females had a much lower psychoticism score than British females.

Hosseini, Mehyrar and Razavich (1973) studied 768 Iranian male students and 241 Iranian female students aged 18 to 20 years. Using the EPI, and the Persian form of the psychoticism scale they found that Iranians scored higher than the British in psychoticism, and Iranian females scored lower on the psychoticism scale than Iranian males. Iranians were higher in psychoticism, concluded Hosseini et al., because of social breakdown brought about by too rapid urbanization.

Method

Subjects

The sample consisted of 87 high school students to whom the EPQ, a teacher's subjective appraisal, and a life style questionnaire were administered. The sample was obtained from the representative daily teaching load of grade ten, eleven, and twelve students of a high school English teacher. The subjects, aged 15 to 19 years, consisted of 39 males and 48 females who attended Dakota Collegiate (900 students) in a middle class suburb of Winnipeg, Manitoba. With one exception, all students were Caucasian and most were born locally.

Instruments

To measure the degree of psychoticism in the students, the Eysenck Personality Questionnaire was chosen. The EPQ is a 90-item test which measures what Eysenck maintains are the three main dimensions of personality: Psychoticism, Extraversion-Introversion, and Neuroticism-Stability. All three are viewed as higher order factors pertinent to normal as well as pathological populations.

To construct the new psychoticism scale, Eysenck created a 106-item questionnaire to measure different aspects of psychoticism and administered the questionnaire to 821 women and 512 men constituting a random sample. Eysenck found that there existed items, theoretically relevent to the hypothesis of a psychoticism factor, that cohered together factorially in a consistent manner, showed relative independence of neuroticism and extraversion, measured psychoticism reliably, gave similar results for males and females, and produced repeatable patterns.

The Psychoticism Scale consists of 25 items, 14 of them keyed for a "yes" response. The items involve a mixture of risk taking, hostility, and insensitivity, and have the overall flavour of psychopathy.

Tellegen (Buros, 1978) described the high psychoticism scorers as careless, impulsive, spurning convention, inconsiderate, unfeeling, and cruel; and also as disliked, deceived, and mistreated. They professed marked social alienation and perceived themselves as both target for and source of malevolent action.

The Extraversion Scale consists of 21 items, 18 of them keyed to a "yes" response. The items carried over to the Extraversion Scale from the EPI or written anew emphasize primarily the sociability component and de-emphasize the compulsivity component of the former Extraversion Scales. The Extraversion Scale is more homogeneous factorially on the EPQ than the EPI.

Eysenck describes the extraversion factor as being closely related to the degree of excitation and inhibition prevalent in the central nervous system. Eysenck describes the typical extrovert as one who is sociable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying by himself. He prefers excitement and action to caution and solitude.

The Neuroticism Scale consists of 23 items, all keyed to a "yes" response. Neuroticism is closely related to the inherent degree of liability. The scale discriminates between normal adults and neurotics. Eysenck describes the high neuroticism scorer as being anxious, worried, moody, depressed, overly emotional, overly reactive. The stable individual responds emotionally only slowly and generally weakly and returns to base line quickly after emotional arousal; he is usually calm, even-tempered, controlled, and unworried.

The Lie Scale consists of 21 items, 6 of which are scored for a "yes" keyed response. The scale basically reflects need for social approval, which is manifested in defensiveness, dissimulation, and social naivete. The items are heterogeneous in content and roughly balanced in keying.

Reliability Studies

The EPQ appears to have satisfactory reliability.

Tellegen (Buros, 1978) studied a sample of 5574 people who were representative of urban England. He found that internal consistencies established by alpha coefficients, presented for samples of female and male "normals" and prisoners averaged about .85 for the Neuroticism and Extraversion Scales. Kline (Buros, 1978) studied the test-retest reliabilities of the Psychoticism, Extraversion, Neuroticism, and Lie Scales using 257 subjects (mostly students). He found test-retest reliabilities of psychoticism (.78), extraversion (.89), neuroticism (.86), and Lie (.84), and concluded that these data indicated the four scales to be sufficiently reliable for use with individuals. The reported internal consistency reliabilities ranged from .68 to .88, with a median of .84. The stability coefficients

determined on normal sample for corresponding value for the Psychoticism Scale was somewhat lower, .78. Scale intercorrelations were quite low, indicating that the scales have very little redundancy.

Stricker (Buros, 1978) studied the internal-consistency reliability for normal examinees on the EPQ. He found that coefficients ranged from .79 to .85 for the Extraversion, Neuroticism, and Lie Scales and was .68 to .74 (males and females) for the Psychoticism Score. He found that test-retest reliability, over a one-month interval for normal examinees, ranged from .80 to .90 for the Extraversion, Neuroticism, and Lie Scales, and was .71 and .83 (male and female) for the Psychoticism Scale.

Loo (1979) studied 139 female and 123 male university students using the EPQ to obtain scale statistics and to perform hierarchical analysis. He found the internal consistency reliabilities of the Extraversion, Neuroticism, and Lie Scales to be in line with those reported in the EPQ Manual.

Validity Studies

The EPQ has been successfuly correlated with the major scales of other validated instruments. Wakefield, Sasek, Brubaker and Friedman (1976) studied samples of 79 and 53 individuals respectively, using the EPQ compared by means of canonical analysis to the Meyers-Briggs Type Indicator and to the Adjective Check List to determine the validity of the EPQ. They found that the Extraversion and Thinking Scales of the Meyers-Briggs Type Indicator and the EPQ Neuroticism Scale were significantly negatively correlated. The Meyers-Briggs Type Indicator Judgment Scale was significantly correlated with the EPQ Lie Scale. The EPQ Psychoticism Scale was positively correlated with the Adjective Check List needs for Autonomy and Aggression and negatively correlated with the needs for Nurturance and Deference. The EPQ Extraversion Scale was positively correlated with needs for Dominance, Heterosexuality, Exhibition, Autonomy, and Change; and negatively correlated with the needs for Succorance, Abasement, and Deference. EPQ Neuroticism was positively correlated with the needs for Succorance and Abasement, and negatively correlated with the need for Dominance.

The canonical analysis of the Adjective Check List and the EPQ yielded two significant canonical components. The first ($R=.77$, $X_{60}^2=96.68$, $p<.01$) had a large canonical weight on the EPQ Extraversion Scale (.92) and on the Adjective Check List Achievement (.55), Dominance (-.49), and Succorance (-.41) Scales. The second ($R=.70$, $X_{42}^2=58.78$, $p<.05$) had large canonical weights on the EPQ Psychoticism (.71) and Neuroticism (.53) Scales, and on the Adjective Check List Nurturance (-.54) and Aggression (-.57) Scales. The results supported the validity of the EPQ.

Friedman, Wakefield, Boblitt and Surman (1976) used the EPQ with 31 schizophrenics formed into a paranoid schizophrenic group ($n=10$) and a nonparanoid schizophrenic group ($n=21$) in order to investigate the validity of the Psychoticism Scale. A comparison group of 20 aids were also given the EPQ. They found that significant differences between the normals and psychotics was consistent with the validity of the Eysenck Psychoticism Scale. That normals differed from Psychotics on the Psychoticism Scale but not on the others suggested support for the discriminant validity of Eysenck's Psychoticism and Neuroticism constructs, they concluded.

Procedure

Permission from the teacher was obtained to administer the EPQ with an accompanying lifestyle questionnaire which asked for information related to students' daily TV viewing, weekly alcohol consumption, whether or not they smoked cigarettes and/or marijuana, and whether they lived with one or both parents.

The classroom teacher was asked to evaluate each student in terms of his or her classroom behaviour. Students who were attentive, cooperative, and had an attention span greater than ten minutes were given a positive evaluation; those who tended toward inattentiveness, uncooperativeness, and had an attention span of under 10 minutes were given a negative evaluation. The classroom teacher had taught English at the school for 12 years, and was considered by both staff and students to be competent and well-liked.

Each student filled in the EPQ with the attached questionnaire at his or her desk during classroom time. The teacher related his subjective evaluation of each student without seeing the student's EPQ psychoticism score. The data were coordinated and analyzed by the writer.

Based on the EPQ psychoticism score, the sample was divided into three groups: 29 high psychoticism scorers, 29 middle psychoticism scorers, and 29 low psychoticism scorers. The high group scored between 5 and 9, the middle group scored between 3 and 4, and the low group scored 2 or less on the EPQ Psychoticism Scale. In the present study, the high and low psychoticism groups were related to teacher evaluation and individual student behaviours. The chi squares in Table 1 have one degree of freedom for each categorical variable matched with the psychoticism scores.

TABLE 1

PSYCHOTICISM RELATED TO TEACHER EVALUATION AND HIGH SCHOOL STUDENT BEHAVIOURS

Categorical Variables Matched with Psychoticism Scores	χ^2	p
Teacher Appraisal (positive or negative)	22.177	< .01
TV Viewing (2 hours per day or less)	3.927	> .05
Alcohol Consumption (5 drinks per week or more)	15.275	< .05
Cigarette Smoking (smokes or doesn't)	20.088	< .01
Marijuana Smoking (smokes or doesn't)	14.224	< .05
Parents (lives with one or both parents)	4.036	> .05
Sex (boy or girl)	16.667	< .05

Discussion

It was found (see Table 1) that there were significant relationships between psychoticism scores and teacher appraisal, alcohol consumption, cigarette smoking, marijuana smoking, and the sex of the subjects. It would appear that high psychoticism scorers received a negative teacher appraisal, drank more alcohol, smoked more tobacco and marijuana, and tended to be male rather than female.

There were no significant relationships found between psychoticism scores and the subjects' TV viewing habits, or residence with one or both parents.

Summary

That there is some relationship between psychoticism, teacher appraisal, and many out-of-school behaviours by students seems to be indicated by the present study. Further research may be indicated to explore in more detail predictive variables and psychoticism in high school students.

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WILLIAM T. FAGAN
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A Longitudinal Study of Grade Five and Grade Eleven Students' Written Language and a Comparison with Teachers' Written Language

Written language may be studied from a number of thrusts: context, audience, process, linguistic output. This study focussed on the latter and interpreted the language used within the Semantic Potential Theory of Language. The main tenet of this theory is that language consists of various types of information and provides input for meaning. A comparison of the written language of grade five students, a sample of these same students in grade eleven, and a group of teachers shows that on all measures, grade eleven students differed significantly from their grade five performance. Few differences occurred between teachers and grade eleven students for total amounts of linguistic information used; when differences occurred on linguistic information proportionate to utterances, the grade eleven students scored higher.

Language is a facilitator of thought, and is the basic medium of communication. Temporally, for most people, oral language precedes the development of written language, and whereas both language systems (oral and written) are related, the exact nature and direction of this relationship is not known. Wrolstad (1976) advises that each language system should be studied in its own right before the relationships across systems are studied.

Written language has been studied from a number of perspectives. Although oral and written language serve a communication function, the nature of the communication function in written language differs somewhat from this function in oral language. Britton, Burgess, Martin, McLeod and Rosen (1975) have identified within written language the function categories: expressive, poetic, and transactional. The latter may be divided into informative and connotative writing. The concept of audience (self, teacher, or wider public) was also addressed in the Britton et al. study.

Dr. Fagan is a Professor in the Department of Elementary Education at The University of Alberta. He has been a teacher of all grades and has also served as a school administrator. He has received a number of academic awards, including a Canada Council Grant for his research into problems of oral and written language of children and adults.

A recent trend in research studies in writing has been to study the processes that lead to and are involved in the production of writing (Cooper & O'Dell, 1976; Emig, 1971; Graves, 1973). However, most research studies in writing have focussed on an analysis of the nature of language produced (Bateman & Zidonis, 1966; Hunt, 1965; Mellon, 1969; O'Hare, 1971).

In order to develop an understanding of written language in toto, it is necessary to pursue research along various thrusts. Certainly information on the function and audience, the context in which writing takes place, the ongoing processes that make writing possible, and the interaction of these factors should contribute significantly to an overall understanding. However, the nature of the language produced is also a vital component in written language, and knowledge of it is important to understand the other factors fully. The nature of written language has been largely described within a transformational generative grammar framework. This theory of language "is now being increasingly challenged" (King, 1978, p. 194), particularly because of its focus on the sentence of isolation, and its "over-concern" for syntax. The notion of deep structure, at least its amenability to research, has also been criticized (Baker, 1976).

Language is one product of writing and the nature of this language has implication for meaning. The Semantic Potential Theory of Language (SPTL) was devised to analyse language from this focus (Fagan, 1978). It is used in this study as a framework to analyse the written language of a sample of grade five children, a sample of grade eleven children (some of whom were from the grade five group six years later), and a sample of teachers for comparison purposes.

Related Literature

The analysis of written language has been approached from a variety of measures: context, function, mode of discourse, processes involved, and form. This study is concerned primarily with the form of written language, that is, the nature of the language that is actually produced. The measure of language employed for this purpose has been usually determined by the theory of language that is being popularized at the time. The studies to be reviewed will be grouped according to periods when a particular theory prevailed.

Traditional grammar. One of the earliest studies on the form of language was by Stormzand and O'Shea (1924) who analysed ten thousand sentences from many sources including children's and authors' writing. One thousand of these sentences were from the writing of grade four, five, six, seven, and eight students. The key measures were sentence length, a ratio indicating degree of subordination, and frequency of noun, adjective, and adverb clauses (time, place). Developmental trends existed for sentence length and degree of subordination. There were inconsistencies with respect to clause type. The measures used in this study (with a few additions) became, as Hunt (1965) said, "standard procedure" in written language development studies. Studies to follow with similar measures and results were: Bear (1939), Biscoe (1951), Frogner (1933), Hoppes (1933), LaBrant (1933), Sam (1962), Seegars (1933), Watts (1944), and Wise (1958).

During the period in which these studies were conducted, the sentence as a valid index of written language development was being questioned. Concern was first raised by Seegars (1933) who suggested clause measures as a substitute. However, the use of the sentence persisted and was still being questioned in 1962,

when Sam (1962) found he could not rely on punctuation to determine sentence boundaries and appealed to the criterion of a sentence being a "complete thought" — which was as much philosophical as it was pragmatic.

Structural grammar. During this period, the key unit of analysis became the various types of sentence patterns (Noun-Verb-Noun, Noun-Be-Adv, etc.) which were specified by Strickland (1962). Studies during this period identified patterns which did or did not increase developmentally (Sam & Stine, 1965; Zenman, 1969).

Hunt's (1965) is a landmark study of written language development. Samples of writing were obtained from grades four, eight, and twelve students, and from Harpers and Atlantic magazines to compare the students' performance to that of mature writers.

Hunt's study is really a transitional study in the sense that it spanned two periods dominated by different linguistic theories (structural and transformational generative). However, one thing which made the study unique was that its key unit of analysis was from neither of these theories. Hunt first employed the t-unit (main clause and attached subordinate clauses), which showed a marked increase in length across grade levels, and which has had a profound effect on subsequent studies. Hunt was not only interested in t-unit length but in those linguistic factors that contributed to its length. He identified a number of such factors — some of which could be roughly equated with transformations from transformational generative grammar. Studies by Bortz (1969) and Perron (1977) also used the t-unit but showed that its length increase was influenced by the mode of discourse analysed.

Transformational Generative Grammar. One of the basic tenets of this theory was that each sentence originates as a kernel (a simple form) and develops complexity by the action of various transformational structures. The number of steps necessary to finalize each transformation per sentence were supposed indicators of language development. Studies during this period usually attempted to identify which transformations occurred at different age or grade levels. Such studies were conducted by Braun and Klossen (1973), Gebhard (1978), Maimon and Nodine (1978), and O'Donnell, Griffin and Norris (1967).

Although some of the studies conducted during this period continued to use the t-unit, the basic unit of the theory was the sentence — with the inherent problems of identification. Furthermore this analysis was entirely syntactic. Nevertheless from these studies arose the movement of "sentence-combining" as the way to bring about increased maturity or development in written language (Combs, 1975, 1976; Fischer, 1973; Mellon, 1969; Miller & Ney, 1968; Morenberg, Daiker & Kerek, 1978; O'Hare, 1971; Pedersen, 1977; Perron, 1974; Stewart, 1978).

Semantic Potential Theory of Language. This theory was devised in response to some of the criticisms of transformational generative grammar, particularly the difficulty in researching deep structure, and the narrowness of focussing on the sentence in isolation from the total discourse. A study utilizing this theory in describing written language development was conducted by Cameron (1979). An analysis of the written language of nine-, ten-, and eleven-year-old children showed changes within each of the categories of information identified in this theory. The present study employs this theory to analyse the written language of grade five children, a sample of these children in grade eleven, and writing from a group of teachers.

Design

In 1973, twenty grade five students and twenty upper elementary teachers participated in a written language study. In groups of five, they were shown materials on "floods." The materials consisted of a film loop, a filmstrip, pictures, and newspaper clippings. The film loop and film strip were shown first. Subjects were allowed to remain as long as they wished to study the pictures and clippings.

Subjects were then taken individually to a small room where they wrote an account of what they had seen. Subjects had been told to pretend that this was a class lecture on social studies and one of their classmates (or for the teachers, one of their pupils) had recently moved to a different province. They were asked to tell that individual in a letter to keep "in touch" all they could about floods which were studied in today's class.

Because directions were not followed in some cases, and because some had not finished within the time available, protocols for analysis were available for fourteen of the twenty teachers.

Six years later (1979) a search was made for the subjects within the grade five group; eight were located. The others had transferred outside the geographic area and were not available. A sample of eight other grade eleven students was chosen randomly from one school and since an analysis of data did not produce any significant differences on variables between these groups, the sixteen subjects were treated as a single group (grade eleven) for purposes of data analysis.

Data Analysis

The analysis of the written language protocols was based on the Semantic Potential Theory of Language devised for an earlier study by the author (Fagan, 1978).

The basic tenet of this theory is that language is a system for providing information (linguistic) which is potential for meaning when interaction between the listener/reader and language occurs. In order to understand meaning, it is necessary to understand the linguistic data which provides input for the activation of perceptual and cognitive processes. Since all language output is input for the listener, it is necessary to account for each linguistic unit.

The two units for initial division of the protocols were the *utterance* and the *maze*. The maze comprises (a) hesitation pauses (repeat and interjection) and (b) correction/edits. The utterance is either a t-unit (main clause and attached subordinate clauses) or an incomplete t-unit (incomplete in the sense that it lacks a subject, verb, required object, etc., and is therefore not structurally complete). An example is "The boy was running for the ship, *from a policeman, anxious to reach the dock*." Utterances are then analysed for data which comprise four categories of linguistic information: denotational, relational, syntactic, and textual.

Denotational information includes such information as nouns, verbs, prepositions, intensifiers, and negatives. Nouns may be related as subjects, objects, or complements, and these, with verbs, make up the Relational category. The sequential arrangement of the denotational and relational information constituted the category of Syntactic structures. Two basic structures are identified:

(D) N V (Adj)(Adv)*(PP)*

(D) N V (Adv)*(N)(N)(PP)*

* (Adv) may occur at any position within the sequence.
(PP) may occur at any point within the sequence except immediately after the first N.

Any other segments that could be written as basic structures were termed *alternate syntactic structures*, that is, an alternate form to the basic structure. These included such structures as "prenominal adjective" (The *black* book . . .), "clauses" (The boy *who is in the boat* . . .), "ing-nominalization" (*While running through the fields*, he . . .). A total of 24 such structures were identified.

These structures were grouped into three sub-categories: relativization (intact), relativization (ellipsis), and complementation. This division was mainly in terms of their structural form but it does have implication for function. Examples are:

Relativization (Intact)	The boy *who was ill* will not attend school today. (adjective clause)
Relativization (Ellipsis)	They saw the boy *jumping into the boat.* (WH + aux/verb)
Complementation	They realized that they could not sail today. (that + S object)

The fourth category, Textual Information, included referential connectives (pronouns, synonyms, class inclusion, etc.) and logical connectives (conjunction, causality, temporal disjunction, etc.). These two categories were also subgrouped (based on a study by Forster, 1978). Items like pronoun, synonym, and repetition made up Category I of the Referential connectives, while class inclusion, formal repetition, etc. made up Category II. Category III was the first subcategory of Logical Connectives and includes conjunction and temporal disjunction (and then). All other logical connectives (causality, condition, temporal conjunction, etc.) made up Category IV.

Based on the findings of the previous study (Fagan, 1978), in order to provide a single design for this study and a companion study on oral language, and in an attempt to limit the analysis to selected parts of the theory, protocols were analysed for Denotational information (intensifiers and negatives), Syntactic information, and Textual information (referential and logical connectives).

Hypotheses

1. A general hypothesis was that there would be differences among the three groups although the direction of the differences was not definite.
2. Findings from the 1978 study showed that the use of negatives and intensifiers increased over age levels. The author was curious as to whether this trend also occurred in written language.
3. In the 1978 study, differences occurred between groups on seven of the twenty-four syntactic structures. The older children tended to use shorter type units and therefore used more alternate syntactic forms per utterance. A similar phenomenon has been regarded as a measure of syntactic maturity (Hunt, 1965). It was hypothesized that the older groups would use more

complex utterances (alternate syntactic forms per utterance) than younger groups. The categorization of alternate syntactic structures into subcategories was first tested in this study and consequently no directional hypotheses are given.

4. Whereas previous studies have shown either some differences across age groups for Referential and Logical Connectives (Fagan, 1978) or that children at a particular grade level react differently to the subcategories (Forster, 1978), the data are not definitive enough to permit directional hypotheses.

Findings

The analysis of the data for the three groups, teachers ($N = 14$), grade five ($N = 20$), and grade eleven ($N = 16$), are reported as means and standard deviations. For some variables, proportions to utterances are given.

Utterances. When teachers and grade eleven students write, they produce significantly more utterances than do grade five students (see Table 1). Very few of these utterances are incomplete t-units. What few incomplete t-units are produced do not differentiate the three groups.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR UTTERANCES, T-UNITS, AND INCOMPLETE T-UNITS

	Means	S.D.	*F*-ratio
Utterances			
Teachers	26.21	12.57	
Grade 5	14.55	6.07	
Grade 11	28.87	11.42	10.50*
T-units			
Teachers	24.21	11.11	
Grade 5	11.80	4.98	
Grade 11	27.37	11.13	14.68*
Incomplete t-units			
Teachers	2.00	4.20	
Grade 5	2.75	3.04	
Grade 11	1.62	1.78	0.62

* Significant at the .01 level.

Denotational Information. Grade eleven students produced significantly more intensifiers than did either the teachers or the grade five sample (Table 2). They also produced more per utterance than did the other groups (Table 3). Of every 100 utterances, 19 contained intensifiers compared to 5 out of 100, and 6 out of 100 for the teachers and grade five students, respectively. Grade eleven students also produced more negatives than any other group as well as more per utterance.

The difference was significant from the grade five means but not from those of the teachers. It has been hypothesized (Fagan, 1979) that intensifiers and negatives may serve a function of focus in oral language and their use may be developmental. This hypothesis may also apply to written language (Cameron, 1979). Examples are: "Parts of Edmonton were threatened by flood waters, but other places were in *extremely* worse positions," "The debris that was deposited along the river banks was *very* high in many places," "Obstacles in the river were *terribly* dangerous to rescuers," "The water causes millions of dollars in damage and destroys heirlooms which can *never* be replaced," "*No* low-lying town should be without some kind of protection."

TABLE 2

MEANS AND STANDARD DEVIATIONS
FOR INTENSIFIERS AND NEGATIVES

	Means	S.D.	*F*-ratio
Intensifiers			
Teachers	1.71	1.43	
Grade 5	1.10	1.83	
Grade 11	4.75	2.95	13.64*
Negatives			
Teachers	1.92	1.20	
Grade 5	0.55	1.63	
Grade 11	2.75	1.52	10.00*

* Significant at the .01 level.

TABLE 3

PROPORTIONAL MEANS AND STANDARD DEVIATIONS
FOR INTENSIFIERS AND NEGATIVES

	Means	S.D.	*F*-ratio
Intensifiers			
Teachers	.05	.04	
Grade 5	.06	.09	
Grade 11	.19	.12	9.44*
Negatives			
Teachers	.07	.02	
Grade 5	.02	.07	
Grade 11	.10	.04	9.20*

* Significant at the .01 level.

Syntactic Structures. Teachers and grade eleven students differed significantly from grade five students on all syntactic measures for total amounts produced (Table 4). The grade eleven students differed from the teachers by producing significantly more alternate syntactic structures and relativization structures. A previous study on oral language development by the author (Fagan, 1979) showed that when speakers embed alternate structures within base structures they tend to accomplish this by using more of the relativization type structures. This same phenomenon appears to be happening in written language as well.

TABLE 4

MEANS AND STANDARD DEVIATIONS
FOR SYNTACTIC STRUCTURES

	Means	S.D.	*F*-ratio
Basic structure			
Teachers	24.21	11.11	
Grade 5	11.90	4.94	
Grade 11	28.25	10.80	16.19*
Alternate syntactic structure			
Teachers	68.35	32.01	
Grade 5	27.95	13.83	
Grade 11	84.62	39.87	17.78*
Relativization			
Teachers	34.00	18.55	
Grade 5	11.85	6.65	
Grade 11	50.50	27.76	18.83*
Ellipsis			
Teachers	23.71	11.15	
Grade 5	11.95	7.45	
Grade 11	23.87	11.72	8.36*
Complementation			
Teachers	10.64	4.28	
Grade 5	4.70	3.01	
Grade 11	10.25	7.01	8.08*

* Significant at the .01 level.

Whereas grade eleven students differed from teachers on the total number of alternate syntactic structures and the subcategory, relativization structures, this appears to be accounted for by the amount of material written, since teachers and grade eleven students did not differ on these measures *per utterance*, although both groups were still significantly different from grade five pupils (Table 5). The fact that none of the groups differed significantly on the use of structures of the ellipsis or complementation type lends more support to the belief that more alternate structures are embedded in base structures at older age levels by using structures of the relativization type (clauses, adjectives, genitives, etc.)

TABLE 5

PROPORTIONAL MEANS AND STANDARD DEVIATIONS
FOR SYNTACTIC STRUCTURES

	Means	S.D.	*F*-ratio
Alternate syntactic structures			
Teachers	2.72	.81	
Grade 5	1.97	.84	
Grade 11	2.85	.55	7.14*
Relativization			
Teachers	1.31	.46	
Grade 5	.83	.42	
Grade 11	1.48	.58	8.44*
Ellipsis			
Teachers	.97	.37	
Grade 5	.82	.44	
Grade 11	.82	.21	0.82
Complementation			
Teachers	.42	.13	
Grade 5	.33	.21	
Grade 11	.36	.19	0.98

* Significant at the .01 level.

Textual Information. Significant differences among the three groups occurred on all but one of the textual information variables (Group II Referential Connectives — class inclusion, inclusion, derivation, etc.). In all cases, the teachers and grade eleven students differed significantly from the grade five group. In two cases, the grade eleven students and teachers differed significantly — the former used significantly more Referential Connectives (in total) and more of the Group I category (pronouns, synonyms, repetitions) (Table 6).

When textual information was analysed, not in terms of total amounts produced, but in terms of amounts proportionate to the utterance (Table 7), a somewhat different picture emerges. Grade eleven students differed significantly from teachers and the grade five group, and used significantly more information from Referential Connectives from Group I of this category and from Group III of the Logical Connectives. With respect to Referential Connectives, the grade eleven students used approximately 20 for every 10 utterances, whereas teachers and the grade five pupils used 15. It may be considered unusual that the grade eleven students, who tended to use more information in most categories, also used more of the information from subcategory III. This includes the conjunctions *and* and *and then*, which usually decline in use over age or grade levels (Fagan, 1978; Fagan, 1979; Cameron, 1979; Loban, 1976). Their decline in use is usually associated with their function of joining or stringing sentences or t-units together to the exclusion of other connectives. However, an analysis of the grade eleven protocols shows a different function. They were used mainly in the syntactic structures within the Ellipsis category, i.e., to reduce the number of words in conveying particular information. For example,

> As the rains continue, *and* the river is swamped with excess water *and* stirred up debris, the only place this water can go is over the banks *and* into the surrounding areas. This causes the flooding of local agricultural fields, *and* very often the destruction of homes.

Since grade eleven students used more Ellipsis structures than the other groups (Table 4), this appears to be an adequate explanation.

The grade five pupils differed from the grade eleven students and from the teachers in their use per utterance of Group II Referential Connectives, and Logical Connectives. In the case of the former, they used significantly fewer. The latter finding is not unusual since the two older groups used more Logical connectives. However, Group II Referential Connectives (inclusion, class inclusion, derivation, formal repetition) tend to be used more sparingly and are considered more difficult than the connectives from Group I of this category. An analysis of grade five protocols showed that instances of inclusion were used more frequently from this subcategory. There were no instances of derivation and only very few instances of the other two connectives. Examples of the use of inclusion are: ". . .*it* was a frightening experience," ". . .when *it* rains," "When the river is really deeply gorged, *it* produces a young river."

TABLE 6

MEANS AND STANDARD DEVIATIONS FOR TEXTUAL INFORMATION

	Means	S.D.	*F*-ratio
Referential Connectives			
Teachers	40.71	22.81	
Grade 5	22.30	10.06	
Grade 11	59.00	23.82	16.41*
Group I			
Teachers	34.14	26.33	
Grade 5	14.35	9.78	
Grade 11	52.87	23.88	16.07*
Group II			
Teachers	7.92	3.12	
Grade 5	7.90	3.72	
Grade 11	8.62	4.37	0.19
Logical Connectives			
Teachers	22.71	11.15	
Grade 5	11.35	6.46	
Grade 11	26.87	11.24	12.78*
Group III			
Teachers	11.64	6.42	
Grade 5	7.00	4.63	
Grade 11	16.75	7.18	11.56*
Group IV			
Teachers	11.21	7.17	
Grade 5	3.90	3.35	
Grade 11	10.12	7.05	7.98*

* Significant at the .01 level.

TABLE 7

PROPORTIONAL MEANS AND STANDARD DEVIATIONS
FOR TEXTUAL INFORMATION

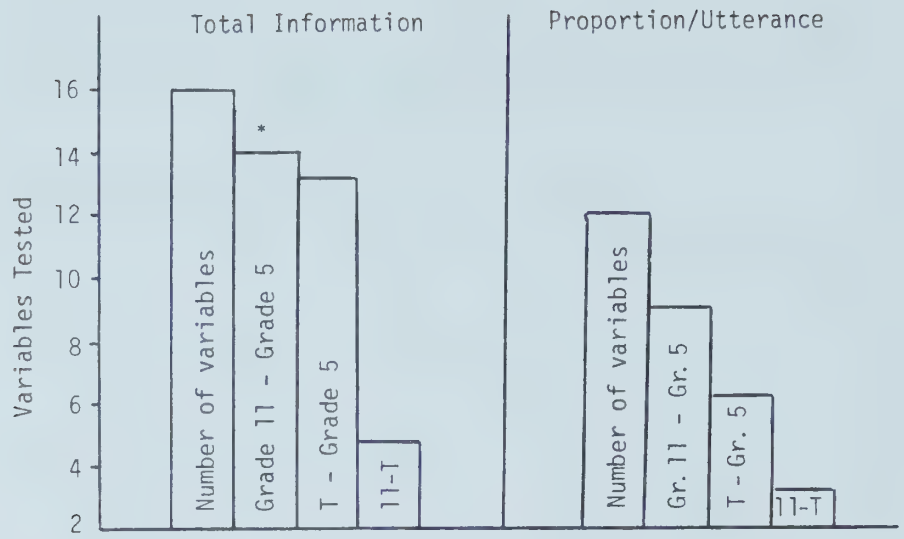
	Means	S.D.	*F*-ratio
Referential Connectives			
Teachers	1.54	.27	
Grade 5	1.56	.62	
Grade 11	2.08	.39	6.60**
Group I			
Teachers	1.21	.37	
Grade 5	.95	.53	
Grade 11	1.84	.49	15.40**
Group II			
Teachers	.35	.16	
Grade 5	.61	.37	
Grade 11	.33	.18	6.16**
Logical Connectives			
Teachers	.89	.26	
Grade 5	.75	.28	
Grade 11	.96	.21	2.94*
Group III			
Teachers	.47	.22	
Grade 5	.45	.20	
Grade 11	.62	.22	2.88*
Group IV			
Teachers	.42	.18	
Grade 5	.26	.19	
Grade 11	.33	.21	2.65

* Significant at the .05 level.
** Significant at the .01 level.

Summary of Findings

Figure 1 can perhaps best provide an overall picture of the differences among the three groups on the variables tested.

An examination of the data in Figure 1 shows that there was much more similarity between the grade eleven students and the teachers than between the grade five pupils and either of these groups. This finding is more obvious for the use of total information than for the use of information proportionate to the number of utterances. When differences did occur between the teachers and the grade eleven students, the latter always used more of the information being assessed. Only in one instance (Group II Referential Connectives proportionate to the number of utterances) did the grade five group use more information than the grade eleven students or the teachers.



* Grade 11 and grade 5 differed on fourteen variables when total information was analysed.

Figure 1. Comparisons of differences among groups on variables tested.

Discussion and Implications

Does written language develop in individuals over the years from the grade five to the grade eleven level and to the level of practising teacher? In terms of the use of various kinds of linguistic information, there appears to be a definite development between students when they are in the elementary grades and when they are in high school. Some kinds of linguistic information do not seem to occur to any great extent in written language. As early as grade five, students have learned that an utterance in written language does not have the same degrees of freedom as utterances may have in spoken language (Fagan, 1978, 1979). The incomplete t-unit was rarely used and did not distinguish the three groups. An analysis of the data for correction/edit type mazes produced too few for analysis. Elementary school students and older subjects have also learned that this is not a written language phenomenon.

A key question still needs to be asked — that is, does use of more of a particular kind of information suggest a maturity or complexity in development? Information, in and of itself, may not necessarily lead to such a conclusion. The nature of the information and its function (examples of its use) must be considered. Grade eleven students, for example, not only used more alternate syntactic structures per utterance, but also proportionately more referential connectives. The former information suggests more complex utterances, whereas the latter suggests one type of information likely used to embed these structures into more complex units.

It has been pointed out that this study was restricted to an analysis of certain linguistic information (as defined by the Semantic Potential Theory of Language). However, other kinds of information used deserve some comment.

The grade eleven sample (only) used headings to organize what they wrote (*Causes, Results of Flooding*), and diagrams to illustrate certain points. Diagrams

were used to illustrate such points as "Farmers often plough at wrong angles to the low point of their land, and the water flows through these plough rivelets" or "A mature river is sloped like." One function of such information is to act as advance organizers; that is, they allow the reader to build up a framework or knowledge structure before reading, which may be used during the course of reading to better synthesize the information presented in running text (Karahalios, Tonjes & Towner, 1979).

Before one draws the conclusion that the grade eleven students are superior to the teachers in their production of written language, other factors must be considered. The audience is one such factor. A study by Crowhurst and Piche (1979) showed that when grade ten students wrote in the argument mode, the syntactic complexity differed depending on whether the audience was a teacher or a best friend. The teachers in the present study were instructed to write for grade five pupils, whereas the grade eleven students wrote for their peers. However, this must be tempered by the comment that since the teachers differed significantly on most variables from the grade five group and did not use aids like headings and diagrams, their writing may not be most suitable for their audience. One conclusion that can be drawn is that by the time grade five pupils reach grade eleven, their manner of writing is significantly different. Other data are needed before it can be stated whether this standard is adequate for grade eleven.

The interweaving of thoughts and their expression have been considered an indicator of language maturity (Fagan, 1978; Hunt, 1976; Loban, 1976; O'Donnell, Griffin, and Norris, 1967) Proponents of discourse analysis (Drum, 1974; Frederiksen, 1975; Grimes, 1972) advocate that interweaving of thoughts must be considered at a level greater than the sentence. This study and the Semantic Potential Theory on which it is based point up types of linguistic information which may be used to achieve this end.

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Low Achievers' Confidence in Their Computational Algorithms

Data were collected from students in Grades 5 through 8 to document the existence of inappropriately high levels of confidence in incorrect computational methods among low achievers. The data consisted of a score on a computational skills test and a score on an algorithm confidence item for each of the four basic operations with whole numbers. The percentage of low achievers classified as having high algorithm confidence was: addition, 85%; subtraction, 79%; multiplication, 70%; and division, 52%. A second sample of low achievers was interviewed and the subjects were able to state justifications for their high levels of algorithm confidence. Possible explanations and implications of the results are discussed.

A substantial number of students fail to master the basic computational skills required of them in mathematics classes in elementary school. While this situation is not new, there appears to be renewed interest among teachers, teacher-educators, and educational researchers in investigating both the causes of students' failure to learn these procedures as well as in the development of various aspects of the remedial process.

One possible parameter of the remedial process concerns the student's degree of confidence in his ability to perform the operation in question. That is, a low achiever's degree of confidence in his ability to apply correctly one or more of the computational algorithms, whether that degree of confidence is too high or too low, may be an important factor in determining the eventual success or failure of a remedial program.

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Dr. James Sherrill, Professor at UBC, is currently Chairman of the Board of Directors of the Educational Research Institute of B.C. and served on the executive committee of the annual conference of the Research Council for Diagnostic and Prescriptive Mathematics. Both men are on the contract team for the 1981 B.C. Mathematics Assessment.

Singer (1977), in his review of research concerning instructional strategies for psychomotor skills, cites findings which suggest that "the more confidence an individual places in a response, the more difficult it will be to unlearn if it is subsequently shown to be incorrect." Macraw and Holding (Taylor, 1970) conclude from their research that "the degree of confidence or conviction with which a response is selected or performed may be a basic variable in this process (subsequent learning)" (p. 198).

Erlwanger (1974), in his study of six children's conceptions of mathematics, found that "in general the children's conceptions underlying their behavior appear to be stable, cohesive, conceptual systems" (p. 277). One of the children, Benny, expressed the belief that the answer to an exercise depended upon the method employed but that the different answers he might obtain were equivalent and, therefore, equally correct.

The authors' clinical experience with students whose computational skills were weak has shown that such students frequently profess a high degree of confidence in their computational methods, even though those methods may result in incorrect responses. The authors' experience has also shown that such students frequently have developed incorrect, idiosyncratic algorithms which they apply with a high degree of consistency.

An example of one such idiosyncratic algorithm is shown below. In this subtraction algorithm, the student simply finds the absolute difference of each pair of digits, regardless of the relative positions of the digits in the exercise.

$$\begin{array}{r} 8173 \\ -6839 \\ \hline 2746 \end{array}$$

The study reported in this paper was designed to seek evidence regarding students' expressed degree of confidence in their use of the computational algorithms for whole numbers. In particular, the purpose of the study was to document the existence of inappropriately high levels of confidence in incorrect computational methods among low achievers.

Method

All of the students in Grades 5 to 8 in a suburban Vancouver, British Columbia school district participated in the first phase of the study. Of the 5 700 students who were present at the time the testing was done, 5 440 (95.4%) provided complete data. The other 260 cases were not used as part of the analysis.

Investigator-developed instruments were utilized for both the measure of algorithm confidence and the measure of computational ability. The former consisted of four Likert-type items, one for each of the whole number operations of addition, subtraction, multiplication, and division (See Figure 1 for an example). Each response was given a score from 1 to 5, with the higher scores indicating higher levels of algorithm confidence. The Hoyt estimate of reliability for the algorithm confidence instrument was 0.83.

It should be noted that the algorithm confidence items required students to evaluate the correctness of their computational *methods* rather than the correctness of their *answers*. In other words, the study represented an attempt to

address the *process* utilized rather than the *product* or result obtained. While a case might be made for either alternative, the process information would appear to have a greater likelihood of providing significant information for planning any remedial work which might be required than would the corresponding product information. Moreover, there is support in the literature (Radatz, 1979) as well as in the analysis of students' errors in the project in which the data were collected for the present study to support the contention that a significant proportion of students' errors in computation are both consistent and process-related.

How sure are you that your way of ADDING is correct?

1. I'm positive my way is correct.
2. I'm pretty sure my way is correct.
3. I don't know if my way is correct.
4. I'm pretty sure my way is wrong.
5. I'm positive my way is wrong.

Figure 1. Algorithm confidence item for addition.

The 44-item test of computational skill was administered immediately after the algorithm confidence instrument. The test consisted of four subtests, one for each of the four basic operations with whole numbers. The division subtest consisted of 8 items while each of the other three contained 12 items. Items for each subtest were selected to correspond to the various levels of generality of application of the algorithm involved. For example, the division items ranged from an example involving a multi-digit divisor with zero in the quotient and a remainder, to one with a one-digit divisor and no remainder. The computation test was pilot-tested in a small number of classes to verify the appropriateness of the items and to ascertain the amount of time needed by students to complete the test. The computation test was administered after the confidence instrument since it was felt that otherwise the subjects' responses might be unduly influenced by their perceptions of their ability to obtain the correct *answers*.

Students were given tables of addition and multiplication basic facts to use during the test. This was done in an attempt to minimize the number of errors caused by lack of mastery of basic facts, thereby making it possible to concentrate upon errors due to lack of mastery of the processes involved. No time limit was imposed for completion of the test. The Hoyt estimates of reliability for the computation tests where as follows: addition subtest, 0.80; subtraction, 0.76; multiplication, 0.78; division, 0.84; total test, 0.88. All of the tests were scored by hand as part of a larger project designed to catalogue the different categories of computational errors made by students.

For a given operation, a low achiever was defined to be a student whose score on that subtest was more than one standard deviation below the mean score for that grade. A student was included in the high algorithm confidence group for a given operation if he selected either of the positive responses (1 or 2) on the corresponding confidence item. Those who selected either of the negative

responses (4 or 5) on that item were classified as members of the low algorithm confidence group for that operation.

The algorithm confidence data were collected by means of a self-report instrument, and Ziller, Hagey and Smith (1969) have commented on the difficulty of obtaining valid responses using such a method. In order to verify the validity of the algorithm confidence data, the algorithm confidence instrument and the achievement test were also administered to all of the students in Grades 5 to 7 (N = 126) from a school in another school district. Of those who took the tests, 19 (15.1%) were selected to be interviewed about their self-report responses. The criteria used to select students for follow-up interviews were that the students had stated that they were "positive" their method of performing one of the operations was correct, and that they had been categorized as low achievers on the corresponding achievement subtest. One week later, an interviewer readministered the algorithm confidence instrument to those students to be interviewed and then, without informing them of their achievement subtest results, questioned them about their response on the self-report instrument. One of the 19 students was absent on the day of the interviews and the first three interviews were used to standardize procedures. The remaining 15 subjects formed the interview sample. A more detailed discussion of the algorithm confidence validation phase of the project is contained in Feghali (1976).

Results

In Table 1, summary statistics for the achievement subtests are presented. Since computational skills are taught for mastery, it is to be expected that the results would be as good as they are. Also, as expected, the results show that students' performance in whole number computation improves with each grade and that they have more difficulty with division than with any of the other three basic operations with whole numbers.

TABLE 1

SUMMARY STATISTICS FOR ACHIEVEMENT TESTS

Grade	No. of Students	Addition		Subtraction		Multiplication		Division	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
5	1 360	11.0	1.7	10.0	2.5	9.1	2.9	4.1	2.7
6	1 474	11.2	1.6	10.4	2.0	10.0	2.2	5.3	2.4
7	1 411	11.3	1.6	10.7	1.9	10.5	1.9	5.9	2.3
8	1 195	11.4	1.4	10.8	1.6	10.7	1.6	6.0	2.1

Table 2 contains the numbers of low achievers, by grade and by operation. As with the data in Table 1, they reflect the generally increasing difficulty of the operations from addition, to subtraction, to multiplication, to division. They also show that the size of the low achieving group is small when compared to the total population.

TABLE 2

FREQUENCY DISTRIBUTION OF LOW ACHIEVERS
BY GRADE AND BY OPERATION

Grade	Addition	Subtraction	Multiplication	Division	Total
5	112	174	236	334	856
6	74	207	156	250	687
7	49	170	154	238	611
8	32	183	189	163	567
Total	267	734	735	985	

A summary of the algorithm confidence data is presented in Table 3, in terms of percents. Students who were high achievers were predominantly highly confident, as was to be expected. However, since it is the inappropriately high confidence levels of low achievers that is the focus of this paper, only data for low achievers is presented in Table 3. Students who declared themselves to be either "positive" or "pretty sure" that their method was correct were classified as having a high algorithm confidence (HAC). Those who said they were either "pretty sure" or "positive" their method was not correct were classified as having low algorithm confidence (LAC).

TABLE 3

ALGORITHM CONFIDENCE RESULTS FOR LOW ACHIEVERS (PERCENT)

Grade	Addition		Subtraction		Multiplication		Division	
	LAC[a]	HAC	LAC	HAC	LAC	HAC	LAC	HAC
5	2	77	6	61	13	54	27	31
6	3	91	2	74	7	68	20	42
7	2	92	2	89	3	81	12	59
8	3	88	2	91	1	82	14	55

[a] LAC: Low Algorithm Confidence; HAC: High Algorithm Confidence

In all 16 results (4 grades x 4 operations), more than 50% of low achievers have high algorithm confidence ratings. It is clear that low achievers in arithmetic computation with whole numbers have unrealistically high levels of algorithm confidence. In fact, in most grades and for most operations, this is true of the overwhelming majority of these low achievers.

The percentages of low achievers who expressed high algorithm confidence are all high for the operations of addition, subtraction, and multiplication. Only in the case of division did a substantial proportion in each grade express a low degree of confidence in their computational method. Further analysis of these data indicated that approximately one out of six of the low achievers in division had not attempted any of the division exercises. Since the pilot testing of the

instruments had shown that virtually all students had sufficient time in which to complete the test, it is unlikely that these low achievers failed to complete the division items because of a lack of time. It seems more appropriate to conclude that these students had no idea how to do the division exercises and, as a result, it is not surprising that they would have low levels of algorithm confidence. Even for division, however, the ratio of HAC subjects to LAC subjects was 5 to 2.

The data in Table 3 also show that, within each grade, there is a tendency for the percentage of low achievers with high algorithm confidence to decrease from addition, to subtraction, to multiplication, to division. On the one hand, this may be a reflection of the increasing difficulty of the algorithms for these operations, and the results in Table 1 would lend support to such a view. On the other hand, since the operations are customarily taught in the order listed above, these results may be interpreted to mean that there is a direct relationship between the length of time a low achiever has worked with an algorithm, even an incorrect one, and that student's algorithm confidence. This latter view is supported by the fact that, for each operation, the data show that the proportion of low achievers having high algorithm confidence scores generally tends to increase from grade to grade.

The final set of results concerns the 15 students who were interviewed to determine what low achievers meant by their high algorithm confidence responses. The data in Table 4 show that 11 of the 15 low achievers interviewed were "positive," on both testing occasions, that their method of performing the operation in question was correct. The other four changed from being "positive" to "pretty sure." None of them switched to a negative (scores of 4 and 5) or inconclusive (score of 3) algorithm confidence category.

TABLE 4

DATA ON INTERVIEWEES

Subject	Grade	Operation	Achievement Test Percent Correct	Algorithm Confidence Scores	
				Test	Retest
1	5	×	66.7	5	4
2	6	÷	37.5	5	5
3	6	÷	62.5	5	5
4	6	÷	62.5	5	5
5	6	÷	25	5	5
6	6	÷	50	5	4
7	6	-	75	5	5
8	6	×	75	5	5
9	6	×	66.7	5	5
10	7	×	41.7	5	5
11	7	÷	37.5	5	4
12	7	×	50	5	4
13	7	-	75	5	5
14	7	-	66.7	5	5
15	7	-	75	5	5

During subsequent interviews, the four students who had changed their algorithm confidence response were asked to give reasons for the change. All of them said that in the week between the two administrations of the confidence instrument they had either had time to rethink their answer or had received some new evidence upon which to base their opinions.

All fifteen of the interviewees were asked the following question: "What makes you so sure your way of adding (subtracting, multiplying, or dividing) is correct?" Although some students gave more than one reason, the results may be summarized as follows. Five students declared that they used the method they had been taught; four stated that teachers, peers, or textbooks used the method they did; four said that some or most of their answers were correct; two said their method usually "worked out"; two others claimed they had been using the same method for a long time; one simply stated that he knew how to do it; and one said that his way was the only correct one. In summary, the interviews showed that these students really believed their computational methods were correct, in spite of their low achievement levels. The interviews support the view that the data obtained on the self-report instrument were valid.

Discussion

The results obtained in this study should be of interest to educators who are in some way involved in the design or delivery of remedial programs in elementary mathematics. Briefly, the results show that low achievers in computation with whole numbers frequently profess a high degree of confidence in their ability to perform such tasks. This situation raises the question of the significance of a student's algorithm confidence level for subsequent remedial work. Future studies might be designed, for example, to investigate the extent to which students' inappropriately high algorithm confidence levels mediate against the success of remedial measures.

One possible explanation of the low achievers' high algorithm confidence ratings may be that the students' self-expectations are not as high as their teachers' expectations of them. Generally speaking, teachers expect students to exhibit a high degree of mastery of computational skills with whole numbers; however, many of the low achieving students who were interviewed seemed rather content with their performances. Six of the fifteen interviewees stated explicitly that their algorithm confidence level was high because they usually obtained a satisfactory (to them) proportion of correct answers, in this case about 50%.

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Predictive Validity of an Individualised Classroom Environment Questionnaire

A strong research tradition in numerous countries has established the predictive validity of student perceptions of classroom learning environment in accounting for appreciable amounts of variance in cognitive and affective outcomes, often beyond that attributable to corresponding pretest performance. The present study explored the predictive validity of a new instrument, the Individualised Classroom Environment Questionnaire (ICEQ), which measures perceptions of five dimensions (Personalisation, Participation, Independence, Investigation, and Differentiation) which distinguish individualised classrooms from conventional ones. A sample of 320 Grade 7 to 9 students in 14 science classrooms provided responses to the ICEQ at mid-year and to seven science-related attitude scales, both at the beginning and end of the year. Simple, multiple, semipartial multiple, and canonical correlation analyses provided consistently strong support for the predictive validity of the ICEQ.

Over the previous ten to fifteen years, considerable interest has been shown internationally in the conceptualisation, measurement and investigation of student perceptions of psychosocial characteristics of their classroom learning environment (see Anderson & Walberg, 1974; Fraser, 1980a, 1980b; Fraser & Walberg, in press; Haertel, Walberg & Haertel, 1979; Moos, 1979; Walberg, 1976, 1979). Although the largest proportion of this work has been carried out in the United States, a significant amount of research has also been conducted in Canada, Australia, and Israel, and a small number of key studies have been done in developing countries including India, Indonesia, Brazil, and Thailand. Furthermore, several key studies in the area have been reported in this journal (Anderson & Walberg, 1972; O'Reilly, 1975; Walberg & Singh, 1974).

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The two most widely used instruments in prior research are the *Learning Environment Inventory* (LEI) (Anderson & Walberg, 1974, 1976) and the *Classroom Environment Scale* (CES) (Moos & Trickett, 1974; Trickett & Moos, 1973). The LEI was developed originally as part of the research and evaluation activities of Harvard Project Physics, whereas the development of the CES grew out of a programme of research in other milieus including psychiatric hospital wards, university residences, families, correctional facilities and therapeutic groups (Moos, 1976). Examples of the dimensions measured by these instruments are Cohesiveness, Friction, Speed, Difficulty, Democracy, Affiliation, Competition, and Innovation. Nevertheless, despite wide usage of the LEI and CES, these instruments have the shortcoming that they neglect dimensions that are salient in classroom settings variously referred to as individualised, open, or inquiry-based. Consequently, Rentoul and Fraser recently developed a new instrument called the *Individualised Classroom Environment Questionnaire* (ICEQ) to measure student perceptions of five environmental dimensions which differentiate individualised classrooms from conventional ones (Rentoul & Fraser, 1979; Fraser, 1980a). The dimensions measured by the ICEQ are Personalisation, Participation, Independence, Investigation, and Differentiation.

Some prior research has involved the use of classroom environment variables as dependent variables. This research has revealed that, when used in curriculum evaluation studies, classroom environment characteristics differentiated revealingly, usefully, and appreciably between classrooms following alternative curriculum materials or teaching strategies (Anderson, Walberg & Welch, 1969; Cort, 1979; Fraser, 1979; Levin, 1980). Other studies have established the criterion validity of classroom environment perceptions in differentiating between classrooms varying in class size (Walberg, 1969a; Anderson & Walberg, 1972), grade level (Welch, 1979) and subject matter (Anderson, 1971; Kuert, 1979). The strongest tradition in past research on classroom environment, however, has involved the predictive validity of student perceptions (i.e., ability to predict student cognitive and affective learning outcomes). Furthermore a large body of past predictive validity studies has provided convincing and consistent support for the predictive validity of student perceptions in accounting for appreciable amounts of variance in learning outcomes, often beyond that attributable to student characteristics such as pretest performance and general ability.

One purpose of the present paper is to make the tradition of prior classroom environment research more accessible to wider audiences by providing a brief overview of past work. The primary purpose, however, is to report the first main study of the predictive validity of the ICEQ, a new measure of environment dimensions salient in individualised settings.

Past Predictive Validity Studies

Past studies have involved a variety of subject areas and grade levels and have reflected numerous methodological variations including sample size, unit of statistical analysis, background variables controlled, and data analysis techniques. In general, however, these studies have involved the prediction of student learning outcomes measured at the end of a school year from student perceptions of the classroom environment at mid-year, often with statistical control for corresponding beginning-of-year learning outcome performance.

A lot of the earliest predictive validity studies involved the administration of the LEI to senior high school classes in the U.S. studying Harvard Project Physics materials. The predictive validity of student perceptions was supported in a study of individual student learning outcomes and individual student environmental perceptions (Walberg & Anderson, 1968), class mean outcomes and class mean environment perceptions (Anderson & Walberg, 1968), and individual outcomes and class mean environment perceptions (Anderson, 1970). Using a variety of units of analysis and other methodological variations, Walberg (1969b, 1969c, 1972) further established the predictive validity of the LEI among senior high school physics classes in the U.S.

Further support for the predictive validity of versions of the LEI in U.S. classrooms comes from Lawrenz's (1976) study of 238 science classes and Cort's study of 81 social studies classes. In Australia, a series of studies involving simplified versions of the LEI among junior high school science students demonstrated that classroom environment variables accounted for appreciable increments in variance in several cognitive and attitudinal measures beyond that attributable to corresponding pretest and general ability (Fraser, 1978a, 1979; Fisher & Fraser, 1980). In Canada, high school students' perceptions on the LEI have been found to be significantly related to examination achievement in a study of eight different subject areas (Walberg & Anderson, 1972) and in a study of mathematics classes (O'Reilly, 1975). In Israel, Hofstein, Gluzman, Ben-Zvi and Samuel (1979) have established associations between Grade 11 chemistry students' perceptions on the LEI and some attitudinal outcomes.

Moos has used the CES with various samples of secondary school students in the U.S. to establish relationships between student perceptions of classroom environment and the outcomes of student satisfactions and moods (Trickett & Moos, 1974; Moos, 1978), student absences and grades (Moos & Moos, 1978), and student reactions (Moos, 1979). Brookover found that U.S. elementary school students' perceptions of five characteristics of the school environment were associated with academic achievement (Brookover & Schneider, 1975; Brookover, Schweitzer, Schneider, Beady, Flood & Wisenbaker, 1978). McDill, Meyers and Rigsby (1967, 1969) used factor-analytic scales based on the College Characteristics Index and the High School Characteristics Index (Stern, 1970) with a sample of over 20 000 U.S. high school students to establish relationships between student perceptions and the outcomes of mathematics achievement and college plans. Scales based on the College Characteristics Index have also been used in Australia to establish relationships between student perceptions and several science-related attitudes among eleventh grade physics students (Gardner, 1976).

Studies conducted in a number of developing countries have supported the cross-cultural predictive validity of student perceptions of classroom learning environment. Walberg, Singh and Rasher's (1977) study of 83 science and 67 social science classes at the tenth grade level in Rajasthan, India, revealed strong associations between perceptions on a Hindi version of the LEI and end-of-course achievement. In Brazil, Holsinger (1972, 1973) used a translated version of the LEI to show that classroom environment was a powerful predictor of the cognitive outcome of information learning and the noncognitive outcome of individual modernity among a sample of 2 533 Grade 3 to 5 students. Chatiyanonda (1978) used a Thai version of the LEI with a sample of 31 twelfth grade physics classes

in Bangkok or nearby provinces to establish that student perceptions accounted for significant increments in the variance in some attitude outcomes beyond that attributable to beginning-of-year attitude scores. In East Java, Indonesia, Paige (1978) used an environment instrument based on the LEI and CES to provide evidence supporting the predictability of achievement and modernity from the classroom perceptions of 60 sixth-grade classes.

A recent meta-analysis (Haertel, Walberg & Haertel, 1979) provides additional strong support for the predictive validity of students' classroom environment perceptions. This research synthesis involved analysis of 734 correlations obtained from 12 studies of 10 data sets in 8 subject areas, encompassing 17 805 students in 823 classes in four nations. Learning outcomes were found to be positively associated with student-perceived cohesiveness, satisfaction, task difficulty, formality, goal direction, democracy, and material environment, and negatively associated with friction, cliqueness, apathy, and disorganisation. Furthermore, the strengths of the outcome-environment relationships were studied as a function of various substantive and methodological characteristics of the studies from which the correlations were taken. It was concluded that the magnitude of the outcome-environment correlation was significantly associated with the dimension of classroom environment considered, the unit of statistical analysis, and the nation in which the study was conducted. Correlation size, however, did not depend upon the sample size, subject matter, type of learning outcome, or presence of control for pretest and general ability.

While there is plenty of evidence from past research to support the predictive validity of various classroom environment instruments, especially the LEI and CES, only a single study of the ICEQ's predictive validity has been undertaken previously. This study (Rentoul & Fraser, 1980), which involved a sample of 285 science and social science students in 15 junior high school classes in Australia, revealed significant associations between student perceptions on the ICEQ and affective (but not cognitive) outcomes. In view of these results, the present study was instigated to explore further relationships between perceptions of the ICEQ and a range of attitudinal outcomes. Before discussing the design and results of the study itself, attention in the next section focusses briefly on the conceptualisation, development, and validation of the ICEQ.

Development of ICEQ

The initial development of the ICEQ (Individualised Classroom Environment Questionnaire), which has been discussed in detail in Rentoul and Fraser (1979) and Fraser (1980a), was guided by the following criteria:

1. Dimensions chosen characterised the classroom learning environment described in the literature of individualised education, including open and inquiry-based classrooms (Elliott & Adelman, 1975; Rathbone, 1971; Walberg & Thomas, 1972; Weisgerber, 1971).
2. Dimensions chosen provided coverage of the three general categories of dimensions delineated by Moos (Insel & Moos, 1974; Moos, 1974) for conceptualising human environments. These three general categories are Relationship Dimensions (nature and intensity of personal relationships), Personal Development Dimensions (basic directions along which personal growth and self-enhancement tend to occur) and System Maintenance and System Change Dimensions (extent to which the environment is orderly, clear in expectation, maintains control, and is responsive to change).

3. Dimensions chosen and individual questionnaire items were considered salient and suitable by a group of educational researchers, practising teachers, and students.

Extensive literature analysis and interviewing of teachers and students revealed that the above criteria could be satisfied with the following five dimensions: Personalisation, Participation, Independence, Investigation, and Differentiation. Items measuring each dimension were written and later modified after receiving reactions from researchers, teachers, and students. The scales were further refined to form a final version by application of item analysis techniques to data collected from samples of students (see Rentoul & Fraser, 1979).

The final version of the ICEQ contains 50 items, with each of the five dimensions being assessed by 10 items. Each item is scored on a five-point scale with the responses of Almost Never, Seldom, Sometimes, Often, and Very Often. The scoring direction is reversed for approximately half of the items. Table 1 clarifies the meaning of each ICEQ scale by providing its classification according to Moos' scheme and a sample item from each scale.

TABLE 1

DESCRIPTIVE INFORMATION AND VALIDATION DATA (ALPHA RELIABILITY, MEAN CORRELATION WITH OTHER SCALES, ANOVA RESULTS FOR CLASS MEMBERSHIP DIFFERENCES) FOR ICEQ

Scale	Descriptive Information		Scale Statistics[a]		ANOVA Results	
	Moos' General Category	Sample Item	Alpha Rel.	Mean Correlation with other Scales	*F*	Eta^2
Personalisation	Relationship	The teacher considers students' feelings. (+)	0.79	0.28	5.0*	0.19
Participation	Relationship	The teacher lectures without students asking or answering questions. (-)	0.70	0.27	4.2*	0.17
Independence	Personal Development	Students choose their partners for group work. (+)	0.71	0.09	10.4*	0.33
Investigation	Personal Development	Students find out answers to questions and problems from the teacher rather than from investigations. (-)	0.69	0.16	3.9*	0.15
Differentiation	System Maintenance	Different students use different books, equipment, and materials. (+)	0.61	0.07	6.6*	0.24

Note. Items designated (+) are scored 1, 2, 3, 4, 5, respectively for the responses Almost Never, Seldom, Sometimes, Often, Very Often.

Items designated (-) are scored in the reverse manner.

[a] Scale statistics were calculated using the class mean as the unit of analysis.

* $p < .01$

Table 1 also summarizes some important scale validation statistics which were calculated for the ICEQ using the sample of 34 Australian classes used in a previous study (see Fraser, 1980a). This sample consisted of 766 Grade 7 to 9 students in 34 separate classes, each in a different government high school spread widely throughout Sydney suburbs and country areas of New South Wales. In particular, Table 1 provides information about scale internal consistency (the

extent to which a given scale measures the same dimension) and discriminant validity (the extent to which a given scale measures a unique dimension not measured by other scales in the instrument). While the alpha coefficient is used as an index of internal consistency, the mean correlation of a scale with the other four scales is used as an index of discriminant validity. Table 1 shows that the value of the alpha coefficient ranged from 0.61 to 0.79 for different scales, thus suggesting that each ICEQ scale has adequate internal consistency reliability. This table also shows that the value of the mean correlation of a scale with the other scales ranged from 0.07 to 0.28. This suggests that ICEQ scales possess satisfactory discriminant validity and that they measure distinct, although somewhat overlapping, aspects of classroom environment.

Another desirable characteristic of any classroom environment instrument is that it be capable of differentiating between the perceptions of students in different classrooms. That is, students within the same class should perceive their class relatively similarly, while mean within-class perceptions should vary from classroom to classroom. This characteristic was explored for each ICEQ scale with the previous sample of 766 students by performing a one-way ANOVA, with class membership as the main effect and using the individual as the unit of analysis, to obtain information about the ratio of between-class to within-class variance. The results of these analyses are shown in Table 1, which indicates that each ICEQ scale differentiated significantly ($p<.01$) between classrooms. Furthermore the eta^2 statistic, which is the ratio of between to total sums of squares (Cohen & Cohen, 1975), was calculated as an estimate of the amount of variance in ICEQ scores attributable to class membership. Table 1 shows that the proportion of variance accounted for by class membership ranged from 15 per cent for the Investigation scale to 33 per cent for the Independence scale.

Design and Results of Study

The present study of the predictive validity of the ICEQ involved a sample of 320 Grade 7 to 9 students in 14 science classes, each with a different teacher. These classes were spread throughout six representative schools (two private and four government) in suburban areas of Sydney, Australia. Approximately equal numbers of boys and girls made up the sample.

The student outcomes studied were a set of seven attitudinal criteria measured by the Test of Science-Related Attitudes (TOSRA) (Fraser, 1978b, 1980c). The seven scales are Social Implications of Science (attitude to the social benefits and problems which accompany scientific progress), Normality of Scientists (appreciation that scientists are normal people rather than the eccentrics often depicted in the mass media), Attitude to Inquiry (attitude to scientific experimentation as a way of obtaining information about the natural world), Adoption of Scientific Attitudes (e.g., open-mindedness, willingness to revise opinions in the light of new evidence), Enjoyment of Science Lessons, Leisure Interest in Science, and Career Interest in Science. Alpha reliability coefficients for TOSRA scales were reported to range from 0.67 to 0.92 for a sample of 1 337 Australian students in Grades 7 to 10 (Fraser, 1980c).

The sample of 320 students responded to TOSRA at the beginning of the 1979 school year and again at the end of the same year. Student perceptions of classroom learning environment were measured with the ICEQ in the middle of the same year. This experimental design permitted examination of the

predictability of end-of-year attitudes from classroom environment perceptions when corresponding beginning-of-year attitude scores were controlled statistically.

A notable feature of prior research into the predictive validity of students' classroom environment perceptions is that a variety of data analytic techniques has been used in exploring outcome-environment relationships. In the present study, it was decided to analyse data and report results in five different ways which reflect emphases in previous studies. Results obtained using these five methods of analysis are recorded in Table 2 for the sample of 320 students.

TABLE 2

SIMPLE, MULTIPLE, SEMIPARTIAL MULTIPLE, AND CANONICAL CORRELATION BETWEEN ATTITUDE AND ENVIRONMENT DIMENSIONS

Scale	Simple Correlation, r					Multiple Correlation	Semipartial Multiple Correlation[a]
	Pers	Part	Indep	Invest	Diff	R	sR
Social Implications of Science	0.31**	0.24**	-0.01	0.25**	-0.02	0.35**	0.25**
Normality of Scientists	0.18**	0.26**	0.10	0.13*	0.04	0.30**	0.26**
Attitude to Inquiry	0.08	0.16**	-0.08	0.02	-0.18**	0.24**	0.22**
Adoption of Scientific Attitudes	0.28**	0.24**	-0.05	0.18**	-0.09	0.30**	0.23**
Enjoyment of Science Lessons	0.32**	0.26**	0.02	0.23**	-0.07	0.37**	0.27**
Leisure Interest in Science	0.29**	0.24**	-0.04	0.19**	-0.13*	0.32**	0.23**
Career Interest in Science	0.27**	0.23**	-0.02	0.21**	-0.04	0.30**	0.22**
					Canonical Correlation:	R_c = 0.43** (Standard raw posttest scores)	R_c = 0.40** (Standard residual posttest scores)[a]

[a] Involves adjustment for corresponding pretest.

* $p < .05$
** $p < .01$

The first and least complex analysis reported in Table 2 is a simple correlational analysis involving scores on the seven attitude posttests and the five ICEQ scales. Results shown in Table 2 indicate that 21 of the possible 35 correlations were significantly greater than zero ($p<.05$), which is 12 times that expected by chance.

Although the simple correlational analysis can provide useful information about relationships between particular attitudinal outcomes and particular environmental dimensions, the multiple correlation of the set of ICEQ scales with each attitude posttest can be considered more revealing. In particular, the multiple correlation provides a more parsimonious picture of the joint influence of correlated environment dimensions on outcomes, and reduces the experimentwise Type I error rate associated with the simple correlational analysis. Table 2 shows that the magnitude of the multiple correlation between scores on an attitude posttest and the set of ICEQ scales ranged from 0.24 for the Attitude to Inquiry scale to 0.37 for the Enjoyment of Science Lessons scale. Moreover these values were significantly greater than zero ($p<.01$) for each of the seven TOSRA scales.

It has been common in past predictive validity research to perform a conservative test of outcome-environment relationships by controlling statistically certain student characteristics, particularly performance on the parallel pretest. That is, for reasons of simplicity, learning environment dimensions have been considered useful predictors of learning outcomes only if they accounted for different variance from that attributable to well-established predictors like pretest. The last column of figures in Table 2 shows the value obtained for the semipartial multiple correlation between each outcome posttest and the set of five ICEQ scales when the effect of corresponding pretest was controlled. Although values of the semipartial multiple correlation (0.22 to 0.27 in Table 2) were somewhat smaller than the corresponding values of the multiple correlation, they were still found to be significantly greater than zero ($p<.01$) for each of the seven attitude scales. Furthermore, since the square of the semipartial multiple correlation represents the increment in explained variance (Cohen & Cohen, 1975), it can be seen that the set of ICEQ scales accounted for an increment of between approximately five and seven per cent of the variance in different outcome posttests over and above that attributable to corresponding pretests.

Although the use of multiple correlations and semipartial multiple correlations overcomes the problem of collinearity between ICEQ scales, collinearity between outcome measures could still give rise to an inflated experimentwise Type I error rate. Canonical correlation analysis, however, can provide a parsimonious picture of relationships between a domain of correlated attitudinal outcomes and a domain of correlated environment characteristics. Consequently two canonical analyses were conducted using standard scores (i.e., scores defined as the number of standard deviations above or below the mean). The reason for using standard scores is that a more meaningful interpetation can be made of canonical weights if all variables in the analysis have been standardised. The first canonical analysis was analogous to the multiple correlational analysis in that it explored relationships between scores on the set of five environment scales and raw scores on the set of seven attitudinal posttest outcomes. The second canonical analysis was analogous to the semipartial multiple correlational analysis in that it explored relationships between scores on the set of five ICEQ scales and residual posttest scores (adjusted for corresponding pretest) for the set of seven attitudinal outcomes.

Table 2 shows that each canonical analysis revealed one significant canonical relationship ($p<.01$). A significant canonical correlation of 0.43 was found between environment scales and raw posttest scores on the attitude scales, and a significant correlation of 0.40 was found between environment scales and residual posttest scores on the attitude scales.

The five separate analyses reported in Table 2 each provides strong support for the predictive validity of the ICEQ. Each analysis, however, leads to a somewhat different interpretation of relationships between individual outcomes and individual environment dimensions. For example, the simple correlational analysis suggests that significantly more positive attitudes were expressed on all attitude scales except Attitude to Inquiry in classes perceived as having greater Personalisation, on all seven attitude scales in classes perceived as having greater Participation, on all attitude scales except Attitude to Inquiry in classes perceived as having greater Investigation, and on two attitude scales (Attitude to Inquiry and Leisure Interest in Science) in classes perceived as having less Differentiation.

The most sophisticated analysis — the canonical analysis of the set of ICEQ scores and the set of posttest attitude scores residualised for corresponding pretest — revealed a somewhat different picture. An examination of the canonical weights for this analysis revealed that, with corresponding pretest controlled, more favourable attitudes on the Social Implications of Science, Normality of Scientists, and Enjoyment of Science Lessons scales were found in classes perceived as being characterised by greater Personalisation, Participation, Independence, and Investigation.

Conclusion

This article has described a study of the predictive validity of student perceptions on a new instrument, the Individualised Classroom Environment Questionnaire (ICEQ), which measures those dimensions which differentiate individualised and conventional classrooms. The sample consisted of 320 junior high school science students, and the outcomes studied were seven science-related attitudes. Relationships between end-of-year attitude outcomes and the classroom environment dimensions were explored using five different methods of data analysis. These were a simple correlational analysis, a multiple correlational analysis involving the prediction of each attitude posttest from the set of ICEQ scales, a semipartial multiple correlational analysis involving the prediction of each attitude posttest from the set of ICEQ scales but with corresponding beginning-of-year attitude controlled, a canonical analysis involving ICEQ dimensions and raw scores on attitude posttests, and a canonical analysis involving ICEQ dimensions and residual attitude posttest scores adjusted for corresponding beginning-of-year attitude. Taken together, results from the five separate analyses provided strong and consistent support for the predictive validity of student perceptions of classroom environment as measured by the ICEQ.

It is noteworthy that the results of the present study generally indicated a positive association between the degree of classroom individualisation and student attitudes. This general pattern of results is consistent with Horwitz's (1979) recent review of open education research which showed that, of 25 attitude studies with statistically significant results, attitudes were more favourable in open classrooms than in traditional classrooms in 23 of the studies.

In addition to providing information about the predictive validity of the ICEQ, this paper also reported additional information supporting the ICEQ's internal consistency, discriminant validity, and ability to differentiate between the perceptions of students in different classrooms. Although this study has furnished some evidence about the validity and potential usefulness of the ICEQ in educational research, it is desirable that other research workers further explore the reliability, predictive validity, and usefulness of the ICEQ with a variety of samples from different countries.

A copy of the ICEQ and scoring instructions is obtainable from the author at School of Education, Macquarie University, North Ryde, N.S.W. 2113, Australia.

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Identifying Learning Disabled Students with a Selected Psychoeducational Test Battery

The following study was undertaken to determine the extent to which a commonly-used test battery in a local-urban school setting could identify a preselected group of learning disabled (LD) children. Using an ecological control sample approach, 236 students in grades four to six were tested. The 25 LD students were later matched at random with 25 Controls. A stepwise linear regression analysis was performed on the total sample, with 22 independent variables and "membership in LD vs. Control" as the dependent variable. A Hotelling's T^2 analysis was conducted on the second group of matched LD and Control students. The regression analysis and T^2 results clearly indicated that the psychoeducational test battery was ineffective in predicting group membership, accounting for only 35% of the variance in prediction. Although both cognitive and noncognitive measures entered into the regression equation, it was concluded that a child's membership in either LD or Control is primarily a function of how his teacher perceives him.

The search for effective means of assessing learning disabled children is continuous and often frustrating. Few professionals feel totally confident in interpreting test data to reach the diagnosis "learning disabled." Historically, diagnosis of learning disabilities has focused on a number of isolated variables.

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Deficits and strengths within the child were identified and labelled. Task analysis has been used to determine level of skill; learning styles have been analyzed and matched with supposed teaching models; motivation, interests, and attitudes have been inventoried and plotted; attention has been given to the significance of parents, siblings, and the home environment. No one would question the importance of each of the variables assessed; however, rarely are they *all* given to reach a diagnosis. Taken singly they provide little information (Hardin, 1978).

The problem faced by school psychologists is that they are often placed in a position where a request is made for a diagnosis of the presence or absence of a learning disability. One reassessment that must be made concerns the knowledge the LD specialists claim to have regarding identification. The special knowledge of these specialists, indeed, the special knowledge on which the entire field rests is the ability to diagnose the presence of learning disabilities in children.

Much of the current debate revolves around the basic question of whether or not the field can back up its claims to knowledge and diagnosis with valid empirical evidence. The answer, says Coles (1978), rests in large part on the nature of the learning disabilities test battery — the set of tests used to determine the quantity and quality of learning disabilities in children.

The central tests in a battery usually evaluate cognitive, affective, and psychoneurological function. Specifically, tests are chosen to assess perception, language, intelligence, self-concept, personality (e.g. locus of control), and school achievement areas. Although the tests are usually categorized as dealing with separate functions, they often overlap since they are all designed to fit (more or less) a model of learning disability based upon an accepted definition. An acceptable definition, and one used in this study is as follows:

> A learning disabled child is one who manifests an educationally significant discrepancy between his tested intellectual potential and actual level of performance. This discrepancy may be evidenced in the area of understanding or using language, spoken or written, which in turn may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. This discrepancy will not be caused by mental retardation, educational or cultural deprivation, severe emotional disturbance, or sensory loss. (County of Strathcona #20, 1978, p.12)

It is apparent that this definition has its limitations. The purpose of a test battery is to determine whether or not a dysfunction (neurological or otherwise) is impeding the child's ability to learn under otherwise normal conditions, a dysfunction that can *exclude* the clauses listed in the definition.

An individual LD test battery will, of course, vary according to problems a child is suspected of having, a school psychologists' preference for particular tests, and the available resources of a school system, agency or clinic. A recent review by Coles (1978) of the ten most frequently recommended tests and evaluations (ITPA, Bender, Frostig, Wepman, Lincoln-Oseretsky Motor Development Test, Graham-Kendell Memory-For-Designs, Purdue Perceptual-Motor Survey, the WISC-R/Binet, a neurological exam by a neurologist, electro-encephalogram) used for diagnosing learning disabilities produced the following summation:

> There is little question that eventually the tests reviewed here will be discarded; the evidence against them is mounting. The central question is really whether recognition of the invalidity of these tests will result in abandonment of an untenable professional

> dogma, or whether it will merely result in the test battery being replaced by other equally questionable instruments. (Coles, 1978, p. 335)

In response to such a critical review, the following study was undertaken to determine the extent to which a commonly used test battery in a local-urban school setting could identify a preselected group of learning disabled children.

Ecological Control Sample

All of the 10 division II classes of Brentwood Elementary School, County of Strathcona No. 20, participated in the study. There were three each from grades four to six, and one full time learning disability class. This school is representative of schools in the County of Strathcona and many other urban communities. It is typically middle class, including families of blue collar and service workers and of some professionals.

The initial population had 252 students in it, but 13 students either moved or transferred out of the school before the year end data could be collected. Three subjects were eliminated from the analysis due to incomplete data. Of the 236 included, 122 were boys and 114 were girls. The total sample of 236 included the 25 subjects classified as LD. A description of the LD sample follows.

The study was conducted in early December to allow the teachers adequate time to become familiar with their students and thus be able to complete the A-M-L Behavior Rating Scale. Also, this is an interval in the school calendar between testing-reporting periods, and far enough in advance of a major holiday that "holiday heart" is not a contaminating factor.

Selection Procedure and Description of the LD Sample

This study included 10 students from the full-time learning assistance classroom (these students had previously received the benefit of a support service classroom) and 15 students currently attending a part-time resource room program (these students were first-time attenders in the special class). The total LD sample therefore comprised 25 students in grades 4 to 6 who were experiencing a two-year delay in one or several academic areas and who attained a full-scale IQ of 90 or higher using the Lorge-Thorndike Intelligence Test.

Following the description offered by Boder (1971), the 25 students in the present sample were categorized as learning disabled, primarily in the major academic areas of reading, language, mathematics, or spelling, but where nonspecific factors were responsible for poor achievement. The classification of the sample into dysphonetics, dyseidetics, and alexics was not possible since achievement failures seemingly occurred without abnormal reading-spelling patterns. Other systems of classification such as those of Doehring and Hoshko (1977), Holmes and Peper (1977), Mattis, French and Rapin (1975) were not considered since the LD subjects in this sample demonstrated little agreement on the syndromes selected by these researchers for classification. Thus, this sample qualified for placement primarily on the basis of average or better IQ, with a two-year deficit in a major achievement area, reasons for this delay being classified as *nonspecific*, although some may have been classified as dysphonic or dyseidetic.

Procedure

The investigation was conducted with the 236 division II elementary school students. The instruments composing the battery were administered in two sessions per classroom by the investigators during regular classroom hours. The measures were presented so that each of the two testing sessions took approximately 45 to 50 minutes of classroom time. The exception to this procedure was with the grade four classes who were requested to spend two additional one-hour sessions completing the Lorge Thorndike Intelligence Test. The Lorge Thorndike is administered in grade five, so scores were available from this test for the grade five and six students from their cumulative records. It was necessary to have the grade four students complete this instrument to have an equivalent measure of intelligence for all subjects. Thus, four instruments were administered by the investigators (Wide Range Achievement Test, Academic Achievement Accountability [AAA] Scale, Student's Perception of Ability Scale [SPAS], Beery Developmental Test of Visual Motor Integration [VMI]) to all division II students, and the additional IQ test to the grade four students. The homeroom teachers of each class were requested to complete an A-M-L Behavior Rating Scale on each pupil in their class. Informal sessions were held with teachers to explain the method used in completing the rating scales, and to counteract the possibility of a "halo effect."

The instruments which required the student to read to complete a question were read aloud by the examiner to the students at all grade levels so they would not be penalized by poor reading skills. Similarly, extended time limits were allowed on items requiring motor responses.

The Canadian Test of Basic Skills was administered in May, 1978, as part of the school systems standardized testing program. It was administered by the classroom teacher, and computer scored. Results return to the schools early in June of each year.

Description of Tests

The test instruments for identifying LD students were selected on the following bases:

1. four of the measures were commonly used throughout the school district (VMI, CTBS, L-Thorndike, and WRAT),
2. literature on predictors of school achievement suggested that consideration be given to noncognitive or personality contructs (AAA, AML, SPAS scales),
3. the instruments had to be group administered because of the importance of administrative time and efficiency, they must have had objective scoring systems, and they must have satisfied adequate reliability and validity data.

A description of the instruments, with reliability/validity data, follows.

Lorge Thorndike Intelligence Test. This test consists of a Verbal Battery (5 subtests) and a Non-Verbal Battery (3 subtests) with specific items for each grade level. The odd-even reliability of the tests for the grade level tested (grade four) is as follows: $r=.93$ for the Verbal Battery, and $r=.93$ for the Non-Verbal Battery (Level B, $N=549$).

The validity is established by correlations with other tests designed to measure achievement. Correlations of the verbal battery with the WISC Verbal Scale and the Stanford-Binet are reported "in the high seventies and low eighties." The

Non-Verbal Scale correlated with the same tests in the "high sixties and low seventies" (Lorge, Thorndike & Hagen, 1967, p. 29).

Canadian Test of Basic Skills (CTBS). The CTBS is a standardized elementary achievement test comprised of eleven subtests which yield six subtotal scores. The split-half reliability coefficients for the grade levels tested are in the .88 to .98 range, with higher reliability coefficients (.95, .98) for language and composite scores.

Validity figures are unavailable for the CTBS. The editors suggest that

> validation is the task of the test interpreter. Because it is impossible to design one achievement test satisfying nationwide objectives, the editors suggest that administrators decide the relationship of the test to local objects. (Hieronymus & King, 1975, p. 6).

The Wide Range Achievement Test (WRAT). The WRAT consists of three subtests measuring achievement in reading, spelling, and arithmetic. The reading subtest was not included in this study as it cannot be group administered. Test-retest coefficients range from .92 to .98 for the reading and spelling subtests, and from .85 to .92 for the arithmetic subtest. Using internal consistency for validation of the subtests, the intercorrelations between Spelling and Arithmetic subtests are .73 (age 9), .76 (age 10), and .76 (age 11). Wagner and McCloy (cited in Jastak & Jastak, 1978) compared the WRAT reading subtest with the Woody-Sangren Silent Reading Test and the New Stanford Reading Test and arrived at coefficients of .78 and .80 respectively.

The Beery Developmental Test of Visual-Motor Integration. The VMI is a form copying test measuring sensory perception and motor skills with 24 designs arranged sequentially by level of difficulty. Dyckman and Rentfrow (1971) report test-retest correlations on children of second, fourth and sixth grade of .62 to .84 (Dyckman & Rentfrow, 1971).

A-M-L Behavior Rating Scale. The A-M-L Rating Scale is an 11-item teacher rating scale designed to identify children with learning and/or behaviour problems. The teacher records student behaviour in three areas (aggression, moodiness, and learning difficulties) on a five-point scale. In a study of children from multi-problem families, the Kuder-Richardson 21 reliability formula showed an r of .74 for one scale and .92 for the other. This scale was included in the study to determine if it was beneficial in improving early identification procedures (Clifford & Cleary, 1972).

Academic Achievement Accountability (AAA) Scale. The AAA is an 18-question student completed questionnaire measuring locus of control regarding academic outcomes. The authors report a median Kuder-Richardson formula 20 of .74. The correlations between Composite Grade Equivalency on the Iowa Tests of Basic Skills and the AAA are in the .30's and significant beyond the .05 level. Means and standard deviations are relatively stable across grades, averaging 75.0 and 9.0 respectively. A high score indicates acceptance of responsibility for academic outcomes. The score range is 18-90 (Clifford & Cleary, 1972).

Students' Perception of Ability Scale (SPAS). The SPAS measures academic self-concept in elementary school children. Estimates of internal consistency using Cronbach's alpha yielded a full scale alpha of .92. The test-retest reliability over a four- to six-week period was .83. The authors report that the ability of the SPAS to identify students with learning problems suggests good experimental validity for the SPAS.

The SPAS subscales measure academic self-confidence in areas of (1) general ability, (2) arithmetic, (3) reading and spelling, (4) school satisfaction, (5) penmanship and neatness, and (6) confidence. The seventh scale is an index of "general academic self-confidence" (Boersma, Chapman & Maguire, 1979).

In total, 22 variables were obtained, including one IQ measure (Lorge Thorndike), six achievement measures from the CTBS, two achievement measures from the WRAT, four personality measures (AML scale), seven self-confidence measures (SPAS), one locus of control measure (AAA scale) and one visual-motor integration score (SMI scale). For a list of these variables, see Table 1.

Data Analysis

The data were analyzed using a stepwise multiple-regression analysis followed by the more stringent Hotelling's T^2 analysis. The stepwise regression analysis was conducted using group membership (control "normals" or learning disabled) as the criterion. The Hotelling T^2 was conducted with 25 students randomly selected from the control group and compared with the learning disabled group. Each variable was examined for differences between the two groups.

Results

Table 1 presents a summary of the results for the predictor variables: means and standard deviations for the learning disabled group, the control group, and the total group taken collectively. As can be seen from Table 1 the differences between means (without regard to statistical significance) are in agreement with general predictions. On many of the variables, a high score suggests academic success; it is expected that members of the control group would score better. On other measures, a high score indicates some learning difficulties; the learning disabled students tend to score higher. Scores on variables such as achievement (Wide Range Achievement Test spelling, Canadian Tests of Basic Skills total), locus of control (Academic Achievement Accountability Scale), intelligence (Lorge Thorndike), and self-concept (Student's Perception of Ability Scale) do appear higher for the control group. Similarly, the A-M-L scores, where a high score indicates teacher concern with pupil behaviour, differ with the learning disabled group scoring higher. An interesting exception, however, is on the Student's Perception of Ability Scale, confidence subscale where the learning disabled group scores are larger. This contradicts the expectations that learning disabled children would demonstrate less academic confidence (Black, 1974).

Given that a learning disabled child is defined as having average intelligence or better, one would expect intelligence scores to be very similar. While both groups are within the average range, the control group scored 11 points higher. Possibly this is due to the nature of the Lorge Thorndike Intelligence Test which is a paper and pencil instrument. The verbal battery requires the examinee to read the items and learning disabled children may be penalized by this approach.

Multiple Regression Analyses

The purpose of multiple regression in this investigation was to determine which linear combination of scores are the best predictors of group membership, specifically, which psychoeducational tests or which combination of them are most effective in discriminating between the learning disabled and the normal students. Table 2 presents a summary of the predictor variables using group membership in either the control group or the learning disabled group as the criterion variable. Twenty variables were entered into the regression equation.

TABLE 1

MEANS AND STANDARD DEVIATIONS ON ALL VARIABLES

Variable	Learning Disabled (n=25)		Control Group (n=211)		Total Group (n=236)	
	$\bar{X}$	s.d.	$\bar{X}$	s.d.	$\bar{X}$	s.d.
IQ	97.24	7.61	108.39	12.27	107.21	12.38
VMI	16.68	2.38	17.45	2.73	17.36	2.71
A of A-M-L	7.96	3.54	8.02	3.25	8.02	3.29
M of A-M-L	8.64	3.70	7.93	3.02	8.00	3.12
L of A-M-L	3.60	0.75	2.04	0.97	2.21	1.06
A-M-L Total	20.20	6.79	17.97	5.99	18.20	6.13
AAA (locus of control)	65.32	12.16	72.89	8.68	72.08	9.43
WRAT Spelling	40.16	6.14	47.37	5.59	46.61	6.08
WRAT Arithmetic	31.04	3.17	33.69	3.16	33.41	3.28
CTBS Vocabulary	21.32	8.36	27.88	6.87	27.19	7.34
CTBS Reading Comp.	30.32	11.03	42.63	12.26	41.32	12.74
CTBS Language	56.84	15.90	90.50	23.18	86.94	24.84
CTBS Work Study Skills	46.08	14.98	64.38	18.54	62.44	19.09
CTBS Mathematics	26.08	8.85	40.24	11.74	38.74	12.30
CTBS Total	180.64	46.42	265.73	64.10	256.72	67.87
SPAS General Ability	7.04	2.51	7.68	2.82	7.61	2.80
SPAS Arithmetic	8.32	2.98	9.44	2.89	9.32	2.93
SPAS School Satisfaction	6.04	2.99	7.65	2.73	7.45	2.84
SPAS Reading/Spelling	6.88	3.06	8.51	3.11	8.26	3.22
SPAS Penmanship/Neatness	6.36	3.12	7.45	3.02	7.31	3.08
SPAS Confidence	3.61	1.93	3.50	1.86	3.38	1.95
SPAS Full Scale	37.96	11.02	43.97	11.54	43.33	11.66

The 'L' of the A-M-L Behavior Rating Scale is the most powerful measure in terms of predicting group membership. Teachers not only seem to be able to predict student academic achievement, they also appear to be effective at identifying learning disabled students. They rate children according to what is present and observable in the classroom. They know if pupils are having difficulty achieving, and the L scale is a reflection of their observation of actual academic behaviour.

Another significant cognitive measure, the Canadian Tests of Basic Skills Language subscale, entered fourth in the regression analysis. Language skills do differentiate the two populations to a degree. Impaired language ability is one of the most prevalent conditions found in the learning disabled and specifically in our LD sample (McGrady & Olson, 1970).

The remaining variables contributing significantly to the regression equation are all nonintellectual factors. An examination of the mean scores on the Academic Achievement Accountability Scale (a locus of control measure) shows that the learning disabled students are more external than the control group. The mean score of the Confidence subscale of the SPAS scale also discriminates between the two groups, but surprisingly, it is the learning disabled sample that scores somewhat higher. If SPAS does measure academic self-confidence, it seems reasonable to predict that high scores on self-confidence would be internally controlled. These apparent contradictions may be the result of special conditions in the learning assistance classes from which the learning disabled sample was drawn. It is possible that the confidence observed here is in fact externally produced.

TABLE 2

MULTIPLE STEP-WISE REGRESSION
PREDICTING GROUP MEMBERSHIP[a]

Step No.	Variable	*F* Value	*p* Level	% Variance Accounted for	% Variance Added
1	L of A-M-L*	60.23	< 0.001	20.47	--
2	AAA*	7.09	0.008	22.82	2.35
3	SPAS Confidence*	6.09	0.014	24.79	1.98
4	CTBS Language*	5.88	0.016	26.66	1.87
5	A of A-M-L*	7.08	0.008	28.85	2.19
6	SPAS Penmanship/Neatness	2.34	0.128	29.57	0.72
7	WRAT Spelling	1.81	0.180	30.12	0.56
8	SPAS Reading/Spelling	2.69	0.102	30.94	0.82
9	SPAS School Satisfaction	0.78	0.377	31.18	0.24
10	IQ	0.88	0.350	31.45	0.27
11	CTBS Mathematics	1.21	0.272	31.82	0.37
12	CTBS Work Study Skills	1.19	0.277	32.18	0.36
13	CTBS Vocabulary	0.58	0.447	32.35	0.18
14	CTBS Total	1.55	0.215	32.83	0.47
15	CTBS Reading Comprehension	1.72	0.191	33.35	0.52
16	SPAS Full Scale	0.20	0.659	33.41	0.06
17	A-M-L Total	0.22	0.639	33.47	0.07
18	M of A-M-L	6.29	0.013	35.35	1.87
19	WRAT Arithmetic	0.24	0.626	35.42	0.07
20	SPAS General Ability	0.01	0.916	35.42	0.01

Note. N=236, p=.05.
No further steps entered beyond step No. 20 with α 0.95

[a] α 0.95

* Denotes variables significant at α=.05

There are two additional measures which belong to this nonintellectual collection of predictors, the 'A' and the 'M' of the A-M-L scale. The A subscale measures aggression; the M, moodiness. The group of four noncognitive measures (locus of control, self-confidence, aggression, moodiness) contribute a combined variance of almost 9% to the total variance in predicting group membership.

Academic measures, with the exception of the Canadian Tests of Basic Skills Language subtest, appear to contribute little towards the prediction of group membership. This may be partially accounted for by the predominance of the L of A-M-L ratings. The teacher, when completing this scale, probably considers a number of intellectual components in arriving at a rating. These considerations ultimately overshadow the results of more formal assessment.

Teacher ratings and nonintellectual personality factors account for only 35% of the total variance in predicting group membership. It appears that the methodology employed in this investigation ignores the heterogeneous character of the learning disabled group. The tests used not to discriminate significantly between learning disabled and controls.

Hotelling T^2 Analysis

When comparing the difference between means of two groups on a single variable, one could employ a *t* test. However, when more than one variable is used, a more rigourous test is the Hotelling T^2 statistic. This procedure compares the differences between all means simultaneously using the covariance among the variables to refine the overall relationship between groups. Results of this analysis are presented in Table 3.

TABLE 3

HOTELLING T^2 — COMPARISON BETWEEN LEARNING DISABLED AND CONTROL GROUPS

	Variable	$\bar{X}$. LD	$\bar{X}$. Control	T^2	*F*	*p* level
1.	IQ	97.24	109.04	20.63	1.485	0.18
2.	VMI	16.68	17.92	3.45	0.248	0.99
3.	AAA	65.32	75.40	11.55	0.831	0.61
4.	WRAT Spelling	40.16	48.36	23.17	1.668	0.12
5.	WRAT Arithmetic	31.04	33.16	5.73	0.413	0.94
6.	CTBS Vocabulary	21.32	28.88	12.51	0.900	0.55
7.	CTBS Reading Comprehension	30.32	45.64	24.77	1.783	0.09
8.	CTBS Language	56.84	93.12	54.14	3.897	<0.01
9.	CTBS Work Study Skills	46.08	66.92	17.51	1.261	0.28
10.	CTBS Mathematics	26.08	40.08	24.349	1.752	<0.09
11.	CTBS Total	180.64	274.64	38.03	2.737	0.01
	Variables 1 - 11	*N* = 25		77.35	5.567	<0.01
12.	A	7.96	7.56	0.21	0.015	1.00
13.	M	8.64	7.72	0.96	0.069	0.99
14.	L	3.60	1.76	71.13	5.119	<0.01
15.	A-M-L Total	20.20	17.04	3.62	0.260	0.99
16.	SPAS General Ability	7.04	8.08	1.85	0.133	0.99
17.	SPAS Arithmetic	8.32	9.72	2.77	0.199	0.99
18.	SPAS School Satisfaction	6.04	8.24	8.41	0.605	0.81
19.	SPAS Reading/Spelling	6.88	9.00	5.56	0.400	0.95
20.	SPAS Penmanship/Neatness	6.36	7.92	3.636	0.262	0.99
21.	SPAS Confidence	3.32	3.92	1.003	0.072	0.99
22.	SPAS Full Scale	37.96	46.88	7.668	0.552	0.85
	Variables 12 - 22	*N* = 25		60.967	4.388	<0.01

On the basis of the 22 variables included in this investigation, considered simultaneously, the Hotelling T^2 indicates a significant overall difference between the two groups ($p \leq .01$). Individual comparisons on the 22 variables show some group differences($p \leq .01$). The discriminating measures include the L of the A-M-L scale, the Canadian Tests of Basic Skills Language subtest, and the Canadian Tests of Basic skills Total Score. Other differences, significant at the $p \leq .10$ level, are CTBS reading comprehension and CTBS mathematics subtests. The five variables just mentioned are cognitive in nature and achievement oriented. Less significant differences ($p \leq .10$ to .30) are those found on the Wide Range Achievement Test Spelling, Intelligence (Lorge Thorndike), and CTBS Work Study Skills. The remaining variables, VMI, AAA (locus of control), WRAT

Arithmetic, CTBS Vocabulary, A and M of the A-M-L scale as well as A-M-L Total, and the SPAS, do not appear to discriminate between the two groups to a significant degree. No major differences are apparent on any of the personality measures.

In reviewing all of the analyses, the L subscale of the A-M-L is consistently an important measure. In the regression analyses cognitive variables appear to account for the greatest amount of the variance, but affective variables do enter and contribute. This is not the case, however, when examining mean differences on all the variables between the two groups. The Hotelling T^2 analysis reveals that the variables showing statistically significant discrimination tend to be achievement oriented. The CTBS Language and the CTBS Reading focus on special areas of difficulty for learning disabled children.

The definition of a learning disabled child used in the County of Strathcona includes an achievement discrepancy clause. These test results clearly show this discrepancy and confirm this part of the definition. Nevertheless, the fact that clear differences exist between the learning disabled group and the controls must be reconciled with the fact that prediction of group membership from the multiple regression analyses was less than ideal.

Discussion and Implications

The major conclusion to be drawn from this study is that this battery of psychoeducational measures is somewhat of a failure in predicting group membership in the learning disability category. Multiple regression analysis does discriminate between the two groups on the basis of achievement, but not on the basis of predicting group membership. This suggests a number of comments. Accounting for only 35% of the variance after introducing 20 test variables into the regression equation seems to indicate that they are not powerful predictors. The tests employed here have a low discriminative ability. From examination of the results of these tests, it is difficult to determine the qualifications for placement in a learning disability class. The single most important predictor, L of the A-M-L Behavior Rating Scale, singly accounts for 20% of the variance. While teachers are good at predicting academic achievement, they are less effective at predicting personality and psychological variables.

Accounting for only 35% of the variance of group membership and predicting achievement much more effectively than learning disability are reasons to assume that some unidentified factors are involved in this study.

One major drawback involves the global nature of the measures used. Several of them, such as the intelligence score, the WRAT scores, and the VMI yield a gross composite score. That is, the instruments are not composed of specific subtests sensitive to individual developmental differences in the subjects. General measures of achievement, intelligence, and motor skills may be acceptable as initial screening device, but may be ineffective predictors in individual cases.

Another problem is the manner in which the scores were treated for analysis. The procedures ignored the possible variation within each child's profile of scores on the several variables. In the learning disabled group, it may be that it is the relationship between variables that accounts for their learning problems. To use a group score on each variable or to use all variables with equal emphasis for each child thus increases the likelihood of not seeing profile characteristics which may very well be significant determinants of their disability.

The characteristics of underachieving children vary greatly, and numerous terms have been employed to describe their symptoms, behaviours, psychological nature, and physical traits (Wallace & McLaughlin, 1975; Baren, Liebel & Smith, 1978). The heterogeneity of the learning disabled population necessitates an individual analysis of each learning problem. It does not appear that one can identify, through selected psychoeducational tests, a single or group of test-related constructs that will effectively identify these children. Given this difficulty, perhaps Coles' (1978) criticism of the tests currently used in the identification is warranted. Most of the tests used in "learning-disability identification" were not initially constructed for that purpose. Use of a battery to identify a learning disability will, therefore, lead the school psychologist to make judgments based on invalid criteria. The answer to such a dilemma would not be that other tests be selected or developed, but rather that an ecological or "total" assessment model be followed that considers the interaction between all relevant factors in isolation (Hardin, 1978).

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Cross-Validation of Das' Simultaneous and Successive Processes with Novel Tasks

The successive and simultaneous factors identified for numerous samples by Das and his colleagues were also isolated for the present sample of 77 normal children in grades K-6. The emergence of these dual modes of processing information using a test battery composed of several novel tasks provides evidence of the generalizability of the successive and simultaneous syntheses that Das has investigated in his applications of Luria's theory.

Das, Kirby, and Jarman (1975, 1979) present a considerable amount of research evidence in support of Luria's model of cognitive functioning, particularly the aspect involved with simultaneous and successive processing. Simultaneous processing involves stimuli which typically have spatial components and require multiple processing, and is linked by Luria to the occipito-parietal areas of the cortex. This type of processing is necessary to form any holistic gestalt and has been associated with tasks such as Raven's Progressive Matrices, Memory for

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Designs, and Design Copying. Simultaneous processing is likely to be involved when a task requires the organization of stimuli with consideration of the relationships between each of several components, regardless of the specific content of the task. In contrast, successive processing involves the integration of stimuli into some temporally organized series. That is to say, each stimulus is related only to the preceding and following ones in a linear fashion. Serial recall of words, free recall of words, and WISC-R Digits Forward have been the tasks most frequently used to identify successive processing factors. According to Luria successive processing is linked to the fronto-temporal areas of the cortex.

With few exceptions, Das, Kirby, and Jarman have employed the same set of tasks to isolate simultaneous and successive processes in factor-analytic investigations of children. In addition, Das, his colleagues, and his students have been the predominant researchers in this area of study. One attempt at cross-validation by independent investigators with a sample of college students (Vernon, Ryba & Lang, 1978), using tasks similar to those developed by Das, produced apparently negative findings. However, college students represent a group that is quite different from the groups of school-age children studied by Das and his colleagues; in addition, the interpretations given the data by Vernon et al. (1978) concerning the lack of support for the Das model seem open to challenge (Das, Cummins, Kirby & Jarman, 1979)

It is evident that replications of Das' simultaneous and successive factors are needed by independent groups of researchers using different types of tasks from the ones used by Das and his colleagues. Such studies should begin by cross-validating the Das model with school-age children, rather than with samples such as college students which have not been systematically investigated by Das et al. (1975, 1979). The present study represents one such attempt at cross-validation with a school-age population.

Method

Sample

The sample was comprised of 77 children (39 boys, 38 girls) in grades K through 6 who attended elementary school in Flagstaff, Arizona. The school is conducted by Northern Arizona University, in which it is located, and contains many children of students, faculty, and staff, as well as a substantial percentage of children from non-university families. The children were spread fairly evenly across the grade range, with 10-14 selected randomly from each grade level. They ranged in age from 52 to 150 months (mean = 99.5 months, SD = 25.6 months) and the racial breakdown was as follows: 94% White, 4% Black, 1% American Indian, 1% Asian. Otis-Lennon IQs were available for 43 of the children in grades 2-6. They earned a mean of 113.8 (SD = 14.0), suggesting that the sample as a whole is above average in intelligence.

Instruments

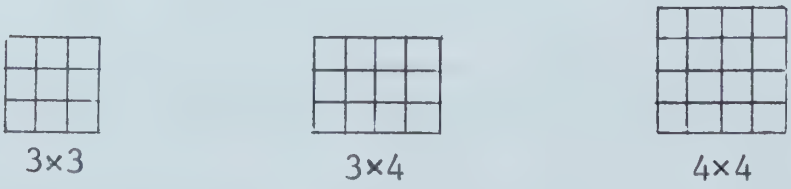
A battery of 11 tasks, six believed to measure simultaneous processing and five hypothesized to assess successive processing, was used. Of the existing tasks, WISC-R Digits Forward (Wechsler, 1974) served as the marker test for successive processing and Raven's Progressive Matrices (Raven, 1956, 1960) was the marker for simultaneous processing. There is a wealth of evidence to show that these two tests consistently load as predicted for a variety of populations (Das et al., 1975,

1979). Whereas Das and his colleagues administer the Coloured Progressive Matrices, we administered the Coloured Matrices (Levels, A, AB, B) along with Levels C and D of the Standard Matrices to ensure sufficient difficulty for the children in the intermediate grades. (Maximum score on Raven's Matrices was equal to 60 points.) The other two existing tasks were WISC-R Block Design and Digits Backward. Block Design was hypothesized to be a simultaneous task, and Digits Backward successive. However, the latter hypothesis was tentative since there is reason to believe that reversing digits differs considerably from repeating digits forward (Costa, 1975; Jensen & Figueroa, 1975).

The seven new tasks were all constructed as part of the test research and development endeavour leading to the Kaufman Assessment Battery for Children (K-ABC; Kaufman & Kaufman, in press). These tasks (some of which are included in revised form in the K-ABC) are described below; the first four were designed to assess simultaneous processing, and the last three were developed to measure successive processing.

Concept Formation. This 47-item subtest is patterned after Bruner's experimental research. The concept formation tasks present to the child six pictures (or designs), three of which are positive examples of a concept and three which are not. For the first two items, the child is told by the examiner what the unifying concept is (e.g. ". . . we are going to look for things to eat"). The child is shown the members in the set by the examiner placing a large cutout square over each picture and identifying each example of the concept by saying "This is one"; for the distractors the examiner simply says "This is not." After exposure to these stimuli, the child is shown an array of new drawings and asked "Is this one?" (an example of the concept) for each of the five drawings in turn. After the first two items, the name of the concept is not given by the examiner who simply identifies which stimuli are and are not examples of the concept. The child must draw the conceptual implications by him/herself. The visual stimuli are composed of approximately one-quarter abstract shapes and designs and three-quarters concrete, meaningful pictures.

Memory for Places. For each of 32 items, the examiner shows the child a page containing from one to seven child-oriented drawings of familiar things arranged in varying positions on the page. After an exposure time corresponding to one second per pictured object, the page is removed. Then a card divided into a grid of rectangular blank boxes is presented and the child is asked to point to the locations of the objects that were just exposed on the stimulus page. The first 15 items use a 3 x 3 grid for responses, while items 16 through 25 increase the difficulty by using a 3 x 4 grid. Items 26 through 32 expand the grid further to a 4 x 4 division of the response page.



Triangles. A task of spatial reasoning and visual motor coordination, Triangles requires the child to manipulate from two to nine plastic triangular shaped pieces (all red on one side and white on the other) to copy designs presented on a set of 38 item cards. The models to be matched remain in the child's view throughout, and there are no time restrictions. Most of the designs to be copied are themselves in the shape of triangles, only a few introductory items are not. The child is always given the correct number of triangles needed to complete the construction. The first four items require only two triangles, and a gradual increase in the number of triangles needed increases the difficulty. Thus, the three-triangle designs proceed to four-triangle ones with guide lines and extend to four-triangle models with no guide lines. Items 15-26 and 27-38 contain eight and nine triangles respectively. This test is intended to be a variant of Wechsler's Block Design.

Overlapping Designs. Constructed along the stencil design motif, in this subtest the child is given a set of eight irregular geometric shapes. Two pieces are yellow, two are white, two are blue, and two are black. The examiner presents 25 hexagon shaped designs made up of differing amounts of these four colours. The child must then place the pieces one on top of the other, using as many as necessary to duplicate the given design. Since there are no time limits and the model is exposed while the child is constructing the design, memory is not a factor for successful performance. The child is required to match the model in both hexagon shape and overall size.

Hand Patterning. This task requires the examiner to produce a series of movements using only one hand. A repetitive pattern is composed by a combination of gentle taps on the table using either fist, palm, or side of the hand. Early items begin with one, then two, such movements and gradually increase up to the most complicated of the 17 items (seven stimulus taps). The child watches the examiner tap out three sequences of movements at the rate of one movement per second (e.g., a relatively easy item was palm-fist, palm-fist). There is a one-second pause between each of three units comprising each item. To be credited, the child must recreate each unit three or more times in a row.

Sequential Hand Movements. Here too the examiner uses a hand to gently tap out movements, this time using the knuckles in addition to the palm, fist, and side of the hand. Each of the 20 items grows increasingly longer and thus more complex; the number of movements in each item ranges from one to six. In contrast to Hand Patterning where the child is asked to repeat a rhythmic pattern, for Sequential Hand Movements the child must produce each movement in sequential order only once. Sequential memory is the key to success on this task, although motor coordination is also involved. Luria used a similar task in his research with brain damaged patients.

Memory for Words. The stimuli on this subtest are a series of commonly known words which the examiner says to the child. The words are read at the rate of one per second, the items range from sets of two through six words. The child is shown a card with the silhouettes of the pictures of each word and responds by pointing to each silhouette in the same order as they were named by the examiner. The first 10 items employ a card with six pictures (e.g., leaf, star) and the remaining 25 items use a different card with seven silhouettes (e.g., hand, moon). The intermediate items use this second card in the same fashion as the first one, but the difficulty level is increased in the last 16 items by introducing an interference task in between the examiner's verbal stimuli and the child's

nonverbal response. This task requires the child to name colours presented on a card as rapidly as possible for five or ultimately 10 seconds. With the exception of the nonverbal mode of response, this task resembles one developed by Luria and used by Das et al. (1975, 1979).

Procedure

The 11 tasks were administered to the children by examiners who were trained in individual assessment and certified as psychometrists. Due to practical constraints, all subjects were not given all measures. All 77 children were administered Digits Forward and Digits Backward; 76 youngsters were given Block Design, Triangles, Overlapping Designs, Memory for Places, and Memory for Words; 72 to 75 were given Concept Formation, Raven's Matrices, and Sequential Hand Movements; and 67 were administered Hand Patterning.

Raw scores on the 11 tasks were intercorrelated, and then a partial correlation matrix was obtained, removing the influence of chronological age. This 11 x 11 partial correlation matrix was subjected to principal components and principal factor analyses. For the principal factor analyses, squared multiple correlations were placed in the diagonals as the initial estimates of communalities. Iteration was performed to obtain better estimates of the communalities, and then varimax rotation was applied. The two-, three-, and four-factor solutions were examined to determine which one made the most psychological sense.

Results and Discussion

The parital correlation, along with means and *SD*s for the 11 variables, are shown in Table 1. The two-factor varimax rotated solution was selected for interpretation, and is presented in Table 2. In the three-factor solution, the Simultaneous factor split in two, with Raven's Matrices and Overlapping Designs having substantial loadings on both the first and third factors. In addition, the third factor was quite small, having an eigenvalue below 0.50 prior to rotation. The four-factor solution produced two trivial factors and was clearly uninterpretable.

TABLE 1

INTERCORRELATIONS AMONG ELEVEN COGNITIVE TASKS, WITH AGE PARTIALLED, OUT FOR CHILDREN IN GRADES K-6

Task	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	$\bar{X}$	SD	N
1. Raven's Matrices	53	40	58	46	32	15	24	22	31	41	32.2	13.3	73
2. WISC-R Block Design		54	53	32	42	38	29	06	32	35	22.7	11.7	76
3. Triangles			43	25	35	17	24	15	10	11	13.8	8.6	76
4. Overlapping Designs				41	36	26	33	31	28	29	8.2	3.6	76
5. Concept Formation					30	09	13	09	19	20	30.8	11.2	72
6. Memory for Places						23	17	26	23	26	16.7	6.6	76
7. WISC-R Digits Forward							28	31	29	25	6.9	1.9	77
8. WISC-R Digits Backward								19	31	22	3.6	1.9	77
9. Memory for Words									34	13	11.3	4.3	76
10. Sequential Hand Movements										44	7.3	2.5	75
11. Hand Patterning											7.8	3.4	67

Note. Decimal points are omitted from the coefficients of correlation.

The two-factor solution shown in Table 2 reflects clear-cut Simultaneous and Successive factors. The six subtests hypothesized to require simultaneous processing had loadings of .45 to .70 on the Simultaneous dimension, and failed to load above .32 on the Successive factor. Similarly, the five tasks believed to measure successive processing loaded .38 to .73 on the Successive factor, but had inconsequential loadings (.25 and below) on the Simultaneous factor.

TABLE 2

VARIMAX ROTATED FACTOR MATRIX FOR CHILDREN IN GRADES K-6, WITH AGE PARTIALLED OUT

Task Task	Unrotated General Factor	Rotated Factors		Communality h^2
		Simultaneous I	Successive II	
Raven's Matrices	71	66*	30	53
WISC-R Block Design	74	70*	30	58
Triangles	55	64*	07	41
Overlapping Design	73	67*	32	56
Concept Formation	47	48*	14	25
Memory for Places	53	45*	28	28
WISC-R Digits Forward	42	18	46*	24
WISC-R Digits Backward	43	25	38*	21
Memory for Words	36	12	44*	20
Sequential Hand Movements	53	11	73*	54
Hand Patterning	49	25	48*	30

Note. Rotated factor loadings of .35 and above are asterisked. Decimal points are omitted.

The emergence of Memory for Places as a Simultaneous task affirms that Factors I and II are not merely "reasoning" and "memory" dimensions, as postulated by Jensen's ability hierarchy theory, but reflect instead the simultaneous and successive syntheses that Das et al. (1975, 1979) propose as an alternative to the ability approach. Digits Backward was the only task that did not load decisively in the predicted direction, producing a .38 Successive loading vs. a .25 Simultaneous loading. Perhaps some simultaneous processing is demanded for success in repeating digits in a reversed order, as suggested by data on brain damaged patients (Costa, 1975; Weinberg, Diller, Gerstman & Schulman, 1972).

The results of our study give strong support to the existence of successive and simultaneous processing dimensions in normal school-age children, and can be interpreted as an independent cross-validation of the model proposed by Das and his colleagues. The breadth of the simultaneous dimension has been extended by the present data. Das et al. (1975, 1979) have typically utilized simultaneous tasks with *abstract* content such as matrices and design copying, but we have found the subtests with *meaningful* content (Concept Formation, Memory for Places) also

load substantially on the Simultaneous factor. The skill involved in Concept Formation, categorical thinking, further expands our understanding of the nature of simultaneous syntheses.

The data in Table 2 regarding the unrotated general factor may be interpreted as loadings on the so-called *g* factor. As one might predict, Raven's Matrices and WISC-R Block Design were among the best measures of *g*, being joined by the new Overlapping Designs task. Whereas the very best measures of *g* were on the Simultaneous factor, one cannot conclude that successive processing tasks, as a rule, are poor correlates of the *g* factor. In our study, two Successive tasks (Sequential Hand Movements and Hand Patterning) had *g* loadings that were comparable in magnitude to the unrotated first factor loadings of three Simultaneous subtests: Triangles, Memory for Places, and Concept Formation. Thus, although some researchers (e.g., Vernon et al., 1978) have maintained that simultaneous processing is higher than successive processing in the intellectual hierarchy, Das may be correct in arguing to the contrary. Das and his colleagues insist that the short-term memory tasks they have used to define the successive factor reflect a very limited sampling of a considerably broader class of behaviour (Das, Kirby & Jarman, 1979). When they have expanded successive processing to include various language tasks, greater equity between the successive and simultaneous dimensions has resulted (Cummins & Das, 1978; Jarman, 1978).

Recently, we have identified Successive and Simultaneous factors in the WISC-R by factor analyzing data for normal, retarded, and referral populations, after first eliminating the Verbal subtests that are heavily dependent on school achievement (Naglieri, Kamphaus & Kaufman, in press). As was stated in the conclusions of that study, we have provided further empirical support of the existence of two styles of information processing, but there can be no inferences about the correctness of the brain localizations postulated by Luria for successive (fronto-temporal) and simultaneous (occipital-parietal) syntheses. In the present study, a blend of old and new tests has yielded clear-cut Successive and Simultaneous factors. However, whether these dimensions are related to front-back brain functioning (Luria, 1966), left-right hemisphere processing (Bogen, 1969), or some other neurological model remains an unanswered question that would be a fruitful topic for future neuropsychological research.

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PERSPECTIVES

Becoming a Teacher: Some Historical Perspectives

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The Whig historian, says Herbert Butterfield, "very quickly busies himself with dividing the world into the friends and enemies of progress" (1931, p. 5). Historical research serves to correct this rendition in detail. The tendency, however, has been "to patch the new research into the old story even when the research in detail has altered the bearing of the whole subject" (p. 6).

Educational historians have inherited several old stories. One is that from the time of Confucius to that of John Dewey, there extends a long line of great teachers whose inspirational qualities justify great-person educational history as a proper study for preservice teachers. A second intimates how wise those forebears who devised forms of public schooling amenable to steady improvement — the roots, indeed, of present perfection. A third declares how these public schools enabled children of humble origin to get on in life, to be socially mobile. Enduring examples are *Three Thousand Years of Educational Wisdom* (Ulich, 1947); *Public Education in the United States* (Cubberley, 1919); and *The Development of Education in Canada* (Phillips, 1957) respectively. Researchers nowadays take such works to task. Some question historical explanations which merely invoke the "influence" of past heroes and heroines. Others say there are educators of days gone by who would have considered such ideas as public schooling insane and treasonous.[1] Yet others speak of school systems shaped not to help children get ahead but rather to give them a future "roughly congruent with the status of their parents" (Katz, 1971, p.

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xviii). The genre includes *The School Promoters* (Prentice, 1977); *Education in the Forming of American Society* (Bailyn, 1960); and *Class, Bureaucracy, and Schools* (Katz, 1971). Each is a nagging reminder of how slow we are "revaluing the whole and reorganizing the broad outlines of the theme in the light of . . . [new] discoveries" (Butterfield, p. 5).

If, then, historical research is intended to set the old story straight through more judicious counterpoise of breadth and depth, how have these balancing acts affected educational history? It can be said that the teaching of this subject to prospective educators these days draws on a wide variety of corrective historical enquiry. Attention to this research, moreover, selectively modifies the old story well beyond course descriptions that once boasted of an historical account from the time of the Ancient Greeks to the present. For those who write either texts or interpretations of extensive coverage and wide appeal, however, the task has proven less manageable. For example, editors of the text *Canadian Education: A History* (Wilson, Stamp & Audet, 1970) offered 21 chapters shared among nine authors and designed to correct the old story according to Bailyn's precept that education is not just formal pedagogy but an entire process. This is not to say that these scholars merely patched the new research into the old story. It is simply to emphasize the difficulty encountered altering the bearing of the whole subject through complex editorial orchestration. Sweeping interpretations such as *American Education: The Colonial Experience* (Cremin, 1970), *American Education: The National Experience* (Cremin, 1980), and *American Education: The Metropolitan Experience* (Cremin, forthcoming) give rise to yet more severe correctional problems. One might expect that single authorship and major publication would together produce the best combination imaginable to correct the old story. To be sure, Cremin mapped out the territory for a monumental work in light of revisionist corrections typified by Bailyn and others in the early 1960's. Carl Bridenbaugh, for one, recognized its "resourceful and prodigious research, breadth of view, balanced judgment, effective organization, and . . . richly rewarding synthesis".[2] So deep the commitment, so necessarily protracted the writing period, though, the vast scholarship thus generated presents a spectacular target for research challenges issued throughout its painstaking development. Hence Clarence J. Karier's contention that despite Cremin's wide focus on what constitutes education, his liberal theory precludes violence, exploitation, genocide and so forth "being treated as intrinsic elements of American history" (p. 459). The result, Karier charges, is new educational history based on an old theoretical model resulting in misleading optimism about America's educational past.

As part of this historiographic ecology where breadth vies with depth, Canadian writers of thematic provincial histories of education take up their pens at some risk. On the one hand, current issues such as ethnic minorities or regional separation prompt provincial researchers to explore topics with a view to explaining their local peculiarities. These scholarly adventures, well exemplified by *Shaping the Schools of the Canadian West* (Jones, Sheehan & Stamp, 1979) and *Schooling and Society in Twentieth Century British Columbia* (Wilson & Jones, 1980), are especially useful for teaching purposes. The best of them probe such hypotheses as that public schooling was the instrument of social conditioning for an urban industrial order. On the other hand, since Phillips' *The Development of Education in Canada* (1957) and *A Brief History of Canadian Education* (Johnson, 1968), no Canadian scholar has managed in a single interpretive educational history to alter the bearing of the whole subject. The result is an ever-lengthening shelf of corrective

anthologies, monographs, and articles cumulatively critical of the same old stories. The provincial researcher might well wonder whether this emendation serves any purpose save perpetual correction in detail or whether it might some day prompt comprehensive synthesis in the bold style of a Cremin.

Lifting particular research beyond mere parochial concerns requires accepting the latter proposition. It rests on the assumption that testing general hypotheses by reference to provincial data can enrich the fund of resources, in ascending order of an analytical refinement, from which persuasive new Canadian educational histories are likely to be refashioned, though not, admittedly, in the absence of new conceptual frameworks. The observations to follow are based on this premise. They arise from the impression that an historiographic lineage founded by MacLaurin (1936) has resulted in continued preoccupation with who was British Columbia's first teacher.[3] They suggest that this distraction obscures any consideration of what teaching might have meant to pre-contact Pacific Northwest Indian society. They attempt to establish something of the range of educational background characterizing several teacher prototypes caught up in the business, administrative, governmental, and social beliefs of their colonial new world milieu. Finally, they preface further research in provincial teacher education. The purpose is re-examination of yet another old story about the evolution of Normal Schools and Faculties — a story which in the light of current charges of irrelevance, boredom, triviality, and simplemindedness, deserves attention.[4]

I

Teaching in what we now call British Columbia did not begin with Hudson's Bay Company initiatives. It began, if one ever begins anything so subtle as teaching, in pre-contact Indian society. As Robin Fisher (1977) warns, it is dangerous to make "generalizations about the Indians of B.C. as if they were culturally similar" (p. xiv). But throughout the region, teaching seems to have involved all reputable elders in fairly close agreement on what knowledge was most worth knowing. There were skills necessary for physical survival — flaking points, spearing salmon, and so forth.[5] Then there were attitudes toward the way society got along — respect for age; acceptance of rank; that sort of thing. Finally there were spiritual beliefs that helped people conceive of their relationship with the non-human world, realized through myths which explained origins and life-cycles and upheavals; thanksgiving ceremonies; healing methods; dances; secret societies.

Because of the closeness of survival skills and social conventions to daily existence, the teaching role must have been in many instances undifferentiated. Reconstructing the days of old, Kwakiutl Chief Charles James Nowell relates how as a boy he lay beside his father at night and listened to stories of ancient potlatches. Kwakiutl Chief James Sewid left similar accounts of how, around the fire, the old people would "pound it into my head to know my relatives" (Spradley, 1969, p. 31).[6] Jenness described particular teaching acts among the Carrier. Before Tsimshian contact, "the boy followed his father and uncles to the chase, the girl helped her mother and aunts in all the domestic duties of camp life" (Jenness, 1929, p. 96). After cultural overlap with Tsimshian ways, Carrier parents and grandparents taught little children. When these grew older, "the mother's brothers and sisters played an important role" (Jenness, 1929, p. 99) teaching skills and customs, gradually tightening supervision to ensure correct

performance and understanding. It would be absurd at this point to speak of teacher education, a term no pre-colonial Indian could possibly have comprehended. In general, though, becoming a teacher required mastery of a particular piece of tribal or clan existence and mastery as well of the gamut of assumptions surrounding it. To illustrate, a Lower Lillooet Indian father teaching his son salmon fishing would first need to know not only the technology of weir construction but also the nature and purpose of the salmon ceremony which included prayer and complex rules governing ritual consumption without which future runs might be expected to fail.

Teaching, however, could constitute a more self-conscious act too, being clearly a matter of social delegation or political appropriation. At potlatches, for instance, chiefs reinforced the present status of the rank-ordering system.[7] On other occasions seasoned members of secret dance societies taught specific skills and subjected novices to stringent initiatory ceremonies. By comparison, public orators, appointed by chiefs, first mastered the language, its myths, its imagery, its powerful delivery, preliminary to oratorical performances upon ceremonial or negotiating occasions.

Teaching carving or the mysteries of the shaman also called for wide cultural as well as technical preparation. A Tsimshian artist born about 1875, Brian Peel apprenticed as a child to Squadin, Aiyansh Chief and a noted wood carver. As a youngster, Peel had to eat specially-prepared food in a prescribed way, watch other carvers at work, and practise himself with a small adze and knife. Later, he worked with Squadin's gifted associates, specializing at length in ceremonial masks with movable parts. By 1910, like antecedents who never saw white men, he became a master carver ready, in turn, to reveal the craft to reliable beginners. Instructing a future shaman in readiness for a teaching role intended to reinforce beliefs about body, soul, and spirit was just as exacting. The Upper Stalo preferred induction from childhood. Interested children of good character learned from shaman parents or grandparents or from an older unrelated shaman retained by parents for the purpose. They were told that solitary wilderness quests would result in encounters with guardian spirits who "instructed the individual, then . . . departed" (Duff, 1952, p. 99). They received help from established shamans in cultivating clairvoyance, sleight of hand, ventriloquism, and perhaps hypnotism, at age 30 or so finally teaching their people of a spiritual order of things permeating the daily round.

Diverse as parents, relatives, elders, chiefs, dancers, orators, carvers, or shamans might have been in their various teaching functions, training for these tasks included common elements. These were observation of the skill in practice; trial and error participation with no stigma attached to honest stumbling; and spiritual instruction to afford the skills in question the reverence they deserved and to place them in the broadest possible human context.

II

In sharp variance to these deeply contextual ways of becoming a teacher are patterns associated with postcontact British Columbia and reflecting old world assumptions. Though different one from another, they overlap in one principal

respect. Each holds teaching to be a specific function carried out in a school by a legitimized agent — a teacher who can be formed for the purpose. Otherwise, approaches presume special priorities according to their cultural points of departure. A note on each of three 19th century British Columbia teachers[8] might serve to illustrate this last contention.

The first such figure is the Reverend Robert John Staines whom James Douglas brought to Fort Victoria in 1849. Staines was born in Oundle, Northamptonshire, where he attended grammar school. At age 19 he entered Cambridge. The next decade witnessed a series of creditable accomplishments — recommendation as vice-principal, St. Mark's College, Chelsea; assistant master (classics and mathematics), Derby Grammar School; recommendation as master of St. Asaph's Grammar School; tutor in Ireland to a military officer's family; proprietor of his own private school at Boulogne sur Mer, France; ordination as Anglican priest through the good offices of influential clerics and administrators.

Why, then, did the Hudson's Bay Company employ as teacher this man who, as it turned out, proved to be one of the company's most tiresome political antagonists?[9] In general it did so because recruiting and retaining manpower on the frontier improved with the promise of "normal" family existence, such normalcy including children's schooling. In particular, Douglas' expectations about becoming a teacher rendered Staines a prestige candidate for the job. In 1840, he had been admitted to St. John's College, Cambridge, where for four years he read mathematics with the College's 11th. Wrangler, F.B. Scott, M.A. Afterwards, he transferred to Trinity Hall, Cambridge, read mathematics and classics, and took his Bachelor of Arts degree in 1845. Within three years, he could boast that his studies fitted him to teach "Classics, Mathematics, and every branch of the usual routine of an English education, including drawing if required" (Slater, 1950, p. 191). The claim underscores two beliefs about teacher education commonly held 130 years ago.

The first of these is that teaching is "an art, learned from experience and association" and dependent upon mastery of a discipline. It is not to be confused with methodology or strategy abstracted beyond the disciplines. Teaching thus construed may not be divorced from learning. In fact, learning is teacher preparation. The view is central to Staines' professional testimonials. And it is unselfconscious. Scott of St. John's College "certified that Staines was his pupil in mathematics and that he considered him fully qualified to teach the first branches of that science" (Slater, p. 189). Marsh of Trinity Hall "considered him a good classical scholar and possessed of considerable abilities, such as would enable him to undertake the tuition of boys preparatory for the universities" (Slater, pp. 189-190). Layng of Oundle Grammar School related his merits as a teacher to his scholarship, including English literature, and referred to his "aptitude."

The second conviction is that since education is a moral enterprise, becoming a teacher presupposes religious instruction. In this light, Staines' supporters spoke of him favourably. William Layng noted his deep attachment to the Church of England. Dean Newland of Ireland styled him "a faithful member of the Church" capable of laying a solid religious foundation in his pupils' minds. Staines himself declared "religious instruction in accordance with the doctrines of the Church of England" (Slater, p. 191) were indispensable to education. As late as 1850 when he was entertaining second thoughts about the schoolmaster's appointment, Governor Douglas conceded that Staines' attention to religious training lay beyond reproach.[10]

III

A contemporary of Staines, the Reverend Honoré Timothy Lempfrit O.M.I., typifies a second priority in the business of becoming a teacher. Born in Lixheim, France, Lempfrit left Oregon territory in 1848 on a mission to Vancouver Island Indians. Without Hudson's Bay Company funds but initially afforded a shelter, he started a school for the Company's Canadian servants, that is, for the wives and children of French Canadian employees. In 1851, he resumed work with the Cowichan Indians, at length departing for San Francisco in 1853 to rejoin his order.[11]

How did this 19th century Catholic become a teacher? In Lempfrit's youth it was believed that priests "should be chosen young and educated in an intensely Catholic atmosphere" (Anderson, 1975, p. 110). Around the age of 12 it is probable that he entered a *petit séminaire* and in due course a seminary under episcopal control. Traditionally, the *petit séminaire* might be either an institution separate from others, with a classical curriculum similar to that of competing secondary schools, or one adjunct to the seminary. Promising boys who could read and write were admitted to learn grammar, plain song, *belles lettres*, the scriptures, sermon-writing, and ritual. They wore ecclesiastical habit, were tonsured, and subject to clerical discipline. Between the old régime and the Second Republic, their curriculum came more to resemble that of the *collège*. After the Restoration, certain of them adopted less-severe dress requirements and were at liberty to follow the subjects of the *lycée*, notably, Latin, Greek, and French, philosophy, history, modern languages, and elementary science. In short, the *petit séminaire* of Lempfrit's day was designed to provide a classical secondary education in a setting conducive to spirituality and religious observance.

Conversely, the seminary was largely devoted to final, thorough preparation for priestly duties, culminating in ordination. McManners describes the tradition as it once applied to the *Grand Séminaire* at Angers. Some seminarians followed theological lectures for a year, others for three years. But it was meditation, liturgy, and orthodoxy rather than scholarship that occupied most candidates. Barnard writes of *grands séminaires* established in Paris and open to young men of eighteen who had "received a general education elsewhere." They exacted strict obedience to regulations, especially the use of Latin, and learned grammar (i.e., elementary classics), Latin and Greek, theology, philosophy, and the sacraments. Mousnier (1974) outlines the education of French Catholic clergy, observing that earlier seminaries emphasized plain chant, liturgy, the sacraments, and scripture. Over the 18th century, philosophy, theology, canon law, and Hebrew appeared on the course of studies. The result, some held, was a clergy "plus intellectuel, plus raisonneur . . . , plus conscient de ses devoirs" (Mousnier, pp. 274-275). Nevertheless, shortly before Lempfrit was born, Emery, the Sulpician Superior of the Angers Seminary, captured the spirit of a seminarian's professional preparation. He is said to have remarked that the first and last goal of that Institute was "to live for God in Christ Jesus our Lord" (translation from Mousnier, p. 275). In Staines' case, it might be argued, religious instruction was part of becoming and being a teacher. With Lempfrit, religion was central. For him, the aim of education was salvation. Who, then, could become a teacher who did not know along which path to find it?

IV

Representing a third route to becoming a teacher is John Jessop, born in 1829 at Norwich, the English cathedral town in whose basillica the Reverend Robert Staines was ordained when Jessop was 19. After schooling in Norwich, in 1846 he sailed for Boston with his parents, eventually arriving in Toronto. There, he graduated from the Toronto Normal School, journeyed to Victoria, and after trying to make a go of things as prospector, political aspirant, printer, and teacher, secured preferment as British Columbia's first Superintendent of Education under the 1872 Public Schools Act. In his day, the notion emerged that teaching may be learned through a fairly short period of special study and practice. This way of thinking, by 1860 accepted in several European countries and American states, characterized Egerton Ryerson's work at the Toronto Normal School.[12] Jessop and others familiar with the idea supported it as directly relevant to B.C. educational needs. As they apply to Ryerson's institution, three aspects of the supposition are of interest here.

One was that normal school training depended on an admission process that screened for character, "capacity, and disposition." Initially, character was assessed through testimonials from clergymen. Capacity and disposition, however, were monitored throughout the term. Thus, anybody inattentive forfeited his free books, tuition, and subsistence allowance. Worse yet for triflers, incapacity, negligence, or misconduct led to dismissal. In fact, during the first seven years from 1847, 6% were required to withdraw and another 14% denied admission. Those who remained acknowledged stiff regulations on personal conduct — especially women who, as residents in a strange city, were held to be "particularly exposed to intrusions and dangers" (Hodgins, 1911, p. 274).

A second feature of Ryerson's scheme was the comprehensiveness of its subjects of instruction. Trainees demonstrating only passing acquaintance[13] with common school knowledge would simultaneously learn the subjects and how to teach them. Their instruction was quite rudimentary, amounting to language skills, history, geography, mathematics, science (including agriculture), music, and "art of teaching," explained at the normal school and tried out in the adjunct model school. This latter art included individual instruction, simultaneous class teaching, and the so-called monitorial method by which "some of the more advanced pupils are employed to teach the less advanced" (Hodgins, p. 37).

A third provision of Ryerson's normal school was religious teaching consisting of weekly two-hour classes conducted by a visiting clergyman according to candidates' denominations, plus mandatory attendance at associated Sunday services in the Toronto area. This practice constituted Ryerson's answer to critics of allegedly Godless public schools or to those who feared public schools might theologically disrupt communities of particular religious persuasions. It was designed to convey a form of liberal Protestantism. Jessop, a Methodist, seems not to have found it inappropriate. Nor, for that matter, did those who would legislate into being the B.C. "secular" public school system it would be Jessop's job to superintend.

V

To review, we first speculated on several contextual ways of becoming a teacher in precontact Indian society. Then we contrasted certain imported beliefs on the subject. One was that to know is to know how to teach. A second was that

paramount to teacher preparation are morality and religion. A third was that distinct from (though not, of course, without) knowing, teaching can be taught. It remains to suggest how, drawn from provincial historical data, such findings might help illuminate a history of teacher education if not alter forthwith the bearing of the whole subject as Butterfield would perhaps have wished.

To begin with, on at least three counts, reference to Indian traditions about becoming a teacher is more than a timely political nod. For one thing, since they concern themselves primarily with schools, Whiggish chroniclers ignore the cultural diffusion of teaching in Indian society. In so doing, they fail to examine an important historical variable affecting subsequent institutionalized education of Indian children under missionary or governmental auspices. For another thing, the very diffuseness of these ancient aboriginal teaching roles obliges educational historians to ponder with some care the actual effect on becoming a teacher of this or that programme, given the formative influence upon any teacher of so many other life experiences. Not unconnected, there remains yet untold the story of preparing Native Indian teachers for service in public education. Toward this end, John Andrews wrote that "at the present time, there are only approximately 25 certificated Indian teachers working in [B.C.] schools. If their number were proportionate to their population, there would be approximately 600" (Andrews, 1974, p. 114). The Native Indian Teacher Education Program at the University of British Columbia and similar schemes elsewhere in Canada have been devised to help correct this disproportionate Native teacher representation. Their efforts stand to gain through historical understanding of becoming a teacher in past civilizations uncomplicated by white intrusion.

Similarly, the cases of prototypical characters such as Staines, Lempfrit, and Jessop force educational historians to reconsider the Whiggish old story of public education and the normal school triumphant. Possibly because Jessop's ideal world of publicly-funded, selective, prescriptive, morally-compelling teacher preparation ran parallel to that of Whiggish administrator/historians, the Staines and Lempfrits of the play remain twilight figures drowning off Cape Flattery or abandoning B.C. in favour of California. The inevitability of and sequential improvements through teacher examinations, normal schools, and education faculties colour ensuing accounts.

In the case of Staines, what is lost is an Oxbridge heritage, namely, that the professional consequence of scholarship could be fellowship, tutorship or schoolmastership and that, as a function of scholarship, resultant ability to teach rests unquestioned. Nor is this a matter of foisting such a perspective on B.C. educational history. It already appears in the purview of independent educators who can write that "if we make it impossible in future to hire from the pool of unaccountable thousands who have excellent academic qualifications, and even outstanding teaching records, but no teacher training, we shall be denying ourselves some valuable opportunities."[14] It already provokes debates over the liberal and technical in teacher education. Thus, some observers stress the central importance of the universities. Others report that "university teacher education was universally alleged to have been useless" and to emphasize in its stead "a short period of intensive skills training . . . on how to handle yourself effectively in a classroom" followed by "a long period of apprenticeship, as much as three years" (Flanders, 1980, p. 7). In short, it is a perspective lacking in which any historical rendering of B.C. teacher education approaches caricature.

In Lempfrit's case, educational histories affording him mere honourable mention thereby underestimate the historic place of religion in becoming a teacher, thus the magnitude of differences on the subject marking even so "secular" a context as that of British Columbia. Granted, Staines was schooled in accepting close Church/state/education ties. And both Staines and Jessop came to believe that the objective of religious education was moral rectitude. But Staines' ordination was precipitate. And as with his peers, Jessop's Normal School religious preparation proved relatively incidental, reflecting Ryerson's belief in the value to future teachers of supposedly general religious truths culled from the scriptures. How different Lempfrit's edification, all aspects of the process permeated by religious doctrine and observance. But as Wilson recently showed (Wilson & Jones, 1980), old stories that see in B.C.'s free public nonsectarian schools the dawn of a better day tend to gloss over opposition from the private sector. By the same token, historians who, alluding to taciturn Canadian political leaders, can quip that they "may have preferred to let sleeping dogmas lie"[15] are unlikely to appreciate the educational positions of Roman Catholic, Doukhobor, Mennonite, Christian Reformed, Seventh Day Adventist, or other church groups. As it applies to becoming a teacher, however, reorganizing the broad outlines of the theme requires not reducing but magnifying "conflicts and tensions" the better to understand an educational perspective which might wish to place salvation above patriotism, adjustment, citizenship, or economic security. In this regard, Downey's incisive analysis, *The Anatomy of a Policy Decision: B.C.'s Bill 33 — The Independent Schools Support Act* (Downey, 1979), furnishes an arresting historiographic example of such a procedure. Articulating competing ideologies of public as opposed to independent educational alternatives, it points to the steady growth of denominational schools and to B.C. government concessions (support for texts, transportation, health services) initiated as early as 1951. No less pertinent to the issue of becoming a teacher, as research in detail Downey's enquiry documents nearly 700 cases of permanent certification based on experience or on qualification, other than university teacher education, acceptable to the Independent Schools Certification Committee.

Unlike Staines and Lempfrit, Jessop emerges from standard discussions of teacher education as a decided friend of progress, thanks in large part to Johnson's attractive portrait of *John Jessop: Gold Seeker and Educator* (Johnson, 1971). Indeed, there is no denying Jessop's fitness for this historical standing. If references to his correspondence and later *Reports* are any measure, he provides a direct link with the perception that teaching can be taught. After at least two decades of ceaseless professional recommendation to this effect, punctuated by tentative enabling legislation, he lived to see his vision of a Normal School in the style of Ryerson's Toronto establishment at last realized, albeit modestly for a start. The perspectives for further research in detail are twofold.

First, no small nostalgia surrounds the now-superseded normal school. Some lament the passing of its legendary capacity to train candidates in management skills, exercising discipline, classroom housekeeping, the orderly use of supplies, and the settling down of classes to quiet learning.[16] In contrast to this encouraging recollection is Vancouver Normal School Principal William Burns' record for posterity of unfulfilled repairs, insufficient lighting, complaints on admissions, underage students, weak discipline in the model school, scanty funds, theft in the cloak room, rude tram conductors, and other contretemps plaguing the administrative scene. Likewise in contrast are fifteen recommendations of the

Survey of the School System (Putman & Weir, 1925) implying low admission standards, short sessions, parochial outlook, isolation from the classrooms of the public system, inadequate practice, outdated curriculum, and dull lectures from underqualified instructors. Faced with this conflicting evidence about a model periodically invoked for the purpose of highlighting today's conjectural shortcomings, historical researchers will want to reassess the early work of the normal school in order that such comparisons may be intelligently drawn,[17] especially should present policy decisions depend on them.

Second, the old story that moving teacher education to the university was an unmitigated advance leaves much unexamined. For the tale obscures resultant professional, and political friction, both on and off campus, so vital to understanding how participating teachers, trustees, ministry officials, professors and candidates perceive their rights, responsibilities, and rewards. It fails to query the consequences of leaguing ex-normal school personnel with freshly qualified educational academics as Canadian universities followed Alberta's lead in the matter. Nor does it account for latter-day allegations that an education faculty could be "poised on the perimeters of the University's intellectual life," having acquired a "tarnished image" through its "Mickey Mouse" courses and research amounting to "organized trivia."[18] Patent, therefore, to revaluing the whole is recognition of the intense cultural significance of becoming a teacher that discord over its manifest perspectives should continue to resound so stridently, so frequently, and from so many quarters.

Notes

1. The general thought is from Bailyn (1960). This way of putting it I attribute to my colleague W. A. Bruneau.
2. Bridenbaugh joins Robert Middlekauff, John Demos, and Merle L. Borrowman in praising Cremin's first volume of the trilogy. The publishers availed themselves of these endorsements.
3. Other works interested in the "first teacher" question from the standpoint of conventional European teacher models include D.A. MacLean, *Catholic Schools in Western Canada: Their Legal Status* (Toronto: The Extension Print, 1923); M.A. Ormsby, *British Columbia: A History* (Vancouver, B.C.: Macmillan of Canada, 1958); M.R. Lupul, "Education in Western Canada Before 1873," in Wilson, Stamp, & Audet (1970); Phillips (1957); Johnson (1964).
4. See The Committee on Teacher Education (1974).
5. For fascinating graphic and textual presentations, see Stewart (1973, 1977).
6. For my discovery of Spradley (1969) and Ford (1941) I am most grateful to my friend Peter Lando.
7. Scholars differ as to whether or not Indian societies harboured a concept of class. Usher compared Drucker's theory of finely-graduated statuses with Boas' assumption of social class distinctions. For development of either theme see Philip Drucker, "Rank, Wealth and Kinship in North Coast Society," *American Anthropologist*, January-March, 1939, 41, Number 1, 55-64, and Franz Boas, Tsimshian Mythology (Washington, D.C.: Bureau of American Ethnology, 31st Annual Report, 1909-1910), both cited in Jean Usher, *William Duncan of Metlakatla: A Victorian Missionary in British Columbia* (Ottawa: National Museum of Canada, Publications in History, Number 5, n.d.).
8. These prototypes are by no means presumed to exhaust the subject. For example, the preparation of women to teach in the many B.C. private schools, religious or otherwise, might very well be a rewarding topic to explore. Alison Prentice, Neil Sutherland, and Juliet Pollard have drawn this matter to my attention.
9. As Rothblatt observed in his *The Revolution of the Dons*, the donnish attitude to professionalism such as Staines would have encountered at Cambridge rested on an "ideal of service" antithetical to trade or industry with its concern for profit, the market, advertising, and competition. Staines was not just a person broadly educated by standards current in his day. He was also a professional — a priest ordained for chaplaincy; a Cambridge man schooled for teaching. At Fort Victoria, he sustained a head-on collision with a pioneer branch of the Hudson's Bay Company, one of the world's most powerful joint stock companies. Accordingly, Staines' eventual clashes with those responsible for the H.B.C. cannot be caricatured only as the anarchical capers of a political agitator. They were as well the impact of a resolute Victorian professional upon resolute Victorian traders who adopted different vantage points from which to survey their 19th century colonial world.

10. The account of Staines is drawn from the generously-documented article by Slater (1950). I am much indebted to this author. The quarrel between Staines and Douglas was complex, but essentially stemmed from differences concerning three sorts of matters. The first was what Staines alleged to be Company lethargy in providing such facilities as housing, a school, a church, a burial ground. The second had to do with Douglas' charge that Staines overstepped his authority upon occasion and meddled with Company business. The third Slater has astutely characterized as conflict between the Company as fur-trader and the Company as colonizer and the effect of this conflict on land prices.
11. I am indebted here to Sister Mary Down (1962). She in turn has consulted data from the Archives, Missionari Oblati Di Maria Immacolata, Via Aurelia 290 Roma (629), Italia. Doubtless these resources hold further clues to Lempfrit's background.
12. See Hodgins (1911). In 1844-1845, Egerton Ryerson visited and admired normal schools in France, Holland, Austria, and Germany. London's normal schools he considered excellent, though not so advanced as the Dublin counterpart run by the Irish National Board. He heaped high praise on similar institutions in Glasgow and Edinburgh, and later rendered an account of the impressive State Normal School at Albany, New York State.
13. Jessop seems to have been more advanced than the general run of candidates in need of instruction in common school subjects. In May of 1853, he enrolled in the Toronto Normal School, having satisfied the authorities that he could read and write as well as do arithmetic, manage Latin and Greek besides, and was of good moral character. At the time, completion of one five-month session qualified candidates for the Second Class Certificate which Jessop achieved in October, 1853, leaving to teach in Darlington. Then in May, 1855, he re-entered the Normal School, completed a second session at high standing, and was granted a First Class Certificate which he put to immediate use teaching at Fingal and later at Whitby. I thank F. Henry Johnson whose *John Jessop* (1971) includes a succinct summary of this phase of Jessop's career.
14. See Alan Brown, Headmaster, and K.T. Stevenson, Board Chairman, St. Georges School, Vancouver, to Parents, October 14, 1977, p. 2.
15. See Johnson (1964), p. 39.
16. See Board of School Trustees, District Number 28 (Quesnel), *Open Letter to all Faculties of Education in the Province of British Columbia* (Quesnel: Board of School Trustees, July 21, 1974).
17. See my article "A Letter from Quesnel: The Teacher in History and Other Fables," *History of Education Quarterly*, Summer, 1975, 15, 2, 131-145.
18. Gilmour (1979). In his admirable chapter "History of Teacher Education in Alberta" (Jones, Sheehan, & Stamp 1979), p. 193, Robert S. Patterson has correctly explained the use of such data. "The intent," he writes, "is not to deprecate the work and achievements of many individuals and groups, but to provide a perspective intended to make us more critical of our past with the hope that we will more appropriately address our current and future needs."

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Ethnography: An Adventure in Interpretive Research

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The current emphasis on qualitative research in the social sciences has brought with it a plethora of terms to describe this form of research. One term, ethnography, which describes a research method of long standing in the field of anthropology, is receiving much attention in the literature on qualitative research methodology. Ethnography, variously known as naturalistic description, analytic description, constructivist approaches or fieldwork is, however, not really a method but is more accurately described as an intellectual activity on the part of the researcher. This important distinction will be explained more fully in the following section.

Ethnography: What Is It?

The definition of Ethnography presented in this paper is that of Geertz (1975, p. 6) who suggested that it was, primarily, "an elaborate venture in 'thick description'." Thick description, Geertz explained, constitutes an "extensive description and interpretive effort at explaining the complexity of social discourse." Acknowledging that the term "thick description" was coined by Gilbert Ryle, Geertz borrows one of Ryle's examples to elucidate its meaning. This example so clearly illustrates what thick description means that it is reproduced here.

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> Consider . . . two boys rapidly constricting the eyelids of their right eyes. In one, this is an involuntary twitch; in the other, a conspiratorial signal to a friend. The two movements are, as movements, identical; from an I-am-a-camera, 'phenomenalistic' observation of them alone, one could not tell which was twitch and which was wink, or indeed whether both or either was twitch or wink. Yet the difference, however unphotographable, between a twitch and a wink is vast; as anyone unfortunate enough to have had the first taken for the second knows. The winker is communicating in a quite precise and special way: (1) deliberately, (2) to someone in particular, (3) to impart a particular message, (4) according to a socially established code, and (5) without cognizance of the rest of the company.

Ethnography, therefore, if used synonymously with thick description, focuses on the meaning of behaviour. It is based on the premise that behaviour is not an end in itself; it is purposeful. Consequently, the ethnographer strives to understand the meaning actors give to their behaviours and actions. Explanations of human behaviour must take into consideration the meanings which those involved assign to their acts. Max Weber has pointed out that man is an animal suspended in webs of significance he himself has spun. The ethnographer tries to unravel these webs so as to understand more fully the "world view" of those he observes. The meanings others ascribe to their actions are, of course, not always self-evident and actors may consciously or unconsciously camouflage their real intentions. As Weber (1964, p. 111) so ably points out: "In the great majority of cases actual action goes on in a state of inarticulate half-consciousness or actual unconsciousness of its subjective meaning." Kaplan (1964, p. 127) captures the essence of the argument that the ethnographer's task is essentially one of a search for hidden meaning. Concerning the task of observation he notes:

> Observation is purposive behavior directed towards ends that lie beyond the act of observation itself . . . . When observation is thought of as passive exposure to perception, its instrumentality is left out of account . . . . In science observation is a search for what is hidden, not just because it *is* hidden, but because its exposure will facilitate an intimate, sustained, and productive relationship with the world.

The ethnographer, then, must endeavour to capture the essence of an event. It is not sufficient to record the event for its own sake; he must try to interpret the meaning of the event for those involved. He must try to discover both the apparent and unapparent import of actions and events.

Geertz described ethnography as a venture in description and interpretation. It could perhaps be better described as an adventure — an adventure in interpretive research. The reader will, I believe, more fully appreciate the adventurous nature of this form of research after reading the following report on an observational study of the administrative behaviour of superintendents conducted by the author. The remainder of this paper focuses on the processes and procedures of the research and on the problems encountered in the use of this type of methodology.

An Observational Study of Superintendents

The author conducted an observational study of the administrative behaviour of eight superintendents in the province of Alberta. The central problem of the study was to observe, describe, and analyze the actual on-the-job behaviour of the superintendent of schools so as to develop a composite view of the nature of his administrative behaviour. The focus, as in Geertz' definition of ethnography, was on description of behaviour and then on interpretation of that behaviour.

A field-study approach was employed to generate an analytic description of the nature of the superintendent's work. Structured observation was used as the primary method of data collection. Mintzberg (1973, pp. 228-229) suggested that the structured observational method has certain characteristics that make it germane to the study of work content. He pointed out that this methodology combines the "inductive power of observation" with the "structure of systematic recording," thus enabling the researcher to "study systematically and comprehensively those parts of managerial work that are not well understood." This methodology allows the researcher to be more flexible in his observations and recordings allowing him to impose a structure during or after, rather than before, he collects his data. It combines the flexibility of unstructured (or open-ended) observation with the discipline of systematic selectivity of data.

Data Collection

Structural data were collected on the pattern of each superintendent's administrative behaviour throughout every minute of each day during the observation period and on all his mail and verbal contacts. A number of steps were used in recording and organizing these data. Examples of these steps are given in the next sections.

Observational notes. The details of the observed administrative behaviour of each superintendent were kept in a series of observational notes. Schatzman and Strauss (1973) recommended that a researcher develop a comprehensive set of field notes on his observations. These notes contained as little interpretation as possible and referred to the *who, what, where* and *how* of an activity.

The next step in the processing of the data was the construction of three different records from the observational notes (adapted from Mintzberg, 1968). The *chronology record* described the sequence of administrative behaviour in terms of major categories of activities — units of behaviour. The *contact record* described each contact that the superintendent made and the *mail record* described each piece of incoming and outgoing mail.

In addition, high-level inference data were generated through the use of theoretical notes (explained in a later section) and an analysis of the "purposes" for which an activity was initiated.

Data Analysis

Low Inference Level Data

Profiles were constructed for the superintendents detailing the proportions of their working time devoted to each of seven major activities identified by Mintzberg (1968) — unscheduled meetings, scheduled meetings, telephone calls, desk work, travel within their systems, evening meetings, and tours and visits to

schools. In addition, a composite picture showing these same categories was constructed for all eight superintendents. Profiles, using the composite scores for all eight superintendents, were developed to answer Guest's (1960, p. 225) "deceptively simple classificatory question, Who does what, with whom, when, and where?"

High Inference Level Data

The high inference level observations consisted, primarily, of two types of data: (1) theoretical notes developed by the researcher and (2) categories of purpose developed to describe the purposes for which the various verbal and written contacts of each superintendent were initiated. An explanation of the development of these two analysis techniques follows.

Theoretical notes (TN's). Schatzman and Strauss (1973) recommended that a field researcher develop theoretical notes as well as his observational notes during and after the observational period. In the field situation the researcher is constantly trying to make sense out of what he observes. One method for doing this is to develop tentative working hypotheses to provide a number of foci for the mass of data recorded from the observations.

It should be noted that data collection and data analysis are not necessarily distinct and separate phases in field research. The field researcher usually engaged in data analyzing activities early in the research process. While writing the observational notes, the researcher also attempts to add to them some reflections and interpretations. Schatzman and Strauss (1973, p. 95) suggested that such attempts by the researcher "represent self-conscious, controlled attempts to derive meaning from any one or several observation notes." Through the development of theoretical notes the researcher strives to make conceptual sense of observed events.

On the one hand, these notes may consist of a detailed elaboration of a particular inference or, on the other hand, they may constitute an attempt to link a number of previously stated inferences into a more abstract statement. The development of theoretical notes is equivalent to the process of data interpretation referred to by McCutcheon (1978, p. 11) as "patterning." She described patterning as "an attempt to see how each discrete fact relates to the total matrix of other facts collected in the . . . situation." By constructing patterns of observed activities, McCutcheon suggested that "discrete actions are given coherence, form, and meaning; they do not remain random isolated acts."

The theoretical notes, therefore, constitute a record of the development of the researcher's thoughts about the meaning of the observed data. They often note and describe events that have been frequently observed. Schatzman and Strauss (1973, p. 109) suggested that "the systematic development of theoretical notes can be thought of as a preliminary analysis."

The purposes for which verbal and mail contacts were initiated. The analysis of the purpose for which each contact and mail item was initiated constituted an important part of the analytic description of the nature of the superintendent's work. Mintzberg (1973, p. 245), in evaluating the importance of the analysis of the "mail and contact purposes" in his study, stated:

> The key to our study was the categorization of the *purpose*. This describes the essential content of managerial activity — in raw form, what five managers did — and it is what led to the development of the theory on roles.

The classification of purpose was a difficult task. The content of each contact and mail item was examined carefully and the question was posed: "What aspect of the administrative task is this concerned with?" The method used to fit purposes into the various subcategories of the superintendent's behaviour was to allow the data to suggest a particular category and strive for consistency through the use of what Glaser (1965, p. 220) referred to as the "Constant Comparative Method." He suggested that when coding an incident for a category the researcher should "compare it with the previous incidents coded in the same category." This process was rigorous, demanding and time-consuming. It necessitated the rereading of the original field notes on numerous occasions until such time as the researcher became thoroughly familiar with the process. Even then, some of the new data on purposes would not "fit" into the established categories and, consequently, new categories had to be established to accommodate some of it.

There were, however, additional data that defied classification. Such data were presented in their "raw" state to support specific conclusions. This was done in response to Geertz's (1975, p. 20) caution that the ethnographer must be wary of trying to impose neat categories and classifications on *all* his observations. He suggested that human behaviour is very complex and all attempts to:

> Set forth symmetrical crystals of significance, purified of the material complexity in which they were located, and then attribute their existence to autogenous principles of order, universal properties of the human mind, or vast, a priori *Weltanshauungen*, is to pretend a science that does not exist and imagine a reality that cannot be found.

Kaplan (1964, pp. 26-27) emphasized this same point. He suggested that the researcher's imposition of a logical order on his data may be "too good to be true." Quoting Scriven, he pointed out that we must be wary of:

> the logician's perennial temptation — make the portrait neat and perhaps the sitter will become neat. Usually there is more to be learnt from a study of the disarray than is gained by intentionally disregarding it.

Kaplan went on to suggest that what we see as a disarray is to the more perceptive eye "a style of dress both useful and elegant."

The development of the theoretical notes and the purpose categorizations constituted an attempt to derive inferences from the observations. The meaning of events to the superintendents themselves was consistently checked by the researcher in both formal and informal conversations. The research conclusions depended heavily on the researcher's interpretation of behaviours and events and on a comparison of these with the interpretations of the respondents. The research was then a "venture in thick description"—an adventure in interpretive research.

This form of research has some definite advantages in conducting field studies, but there are also a number of problems associated with it. After a brief consideration of its strengths, I want to examine a number of its limitations and suggest some steps that a researcher could employ to minimize such problems.

Strengths and Weaknesses of the Ethnographic Approach

The research instrument in a study of this nature is really the observer himself. This fact is both a crucial strength and a crucial weakness. Kerlinger (1973, p. 538) captured the essence of this argument when he suggested that:

> The observer must digest the information derived from his observations and then make inferences about constructs . . . . The strength is that the observer can relate the observed behavior to the constructs or variables of a study: he brings behavior and construct together . . . . The basic weakness of the observer is that he can make quite incorrect inferences from observations.

However, Becker and Geer (1957, p. 32) suggested that the observer who is aware of these problems of inference is well equipped to deal with them because "he operates, when gathering data, in a social context rich in cues and information of all kinds." They argued that this "evergrowing fund" of information gives the observer "an extensive base for the interpretation and analytic use of any particular datum."

The ethnographer, however, despite Becker and Geer's encouraging words, must be wary of presenting observed facts as self-validating; to do so is to take a great deal of licence with many established research principles. Data gathered through direct observation are still data despite the fact that the observer usually both gathers and interprets the data himself. Trow (1957, p. 35) pointed out that "the data he collects are not a substitute for the interpretative inference. We all forget that at our peril."

Schatzman and Strauss (1973, p. 53) suggested another advantage of the observation method. They suggested that in using an observational approach the researcher does not need to rely on "first impressions for his descriptive and analytic stimulation" but endeavours to sustain a continuing "de novo sensitivity and appreciation" of all occurrences. In this way the researcher can avoid jumping to hasty conclusions and he can test his developing hypotheses in the light of later events: he is free to move from data to hypotheses and back again. Lutz and Ianaccone (1969, pp. 115-116) stressed an additional advantage of this research method. They pointed out that through the use of an inductive approach the "classification of (observed) behavior is not forced into a preconceived scale or index of behavior." In a sense, the data are allowed to "speak for themselves" and "categories of behavior can be modified and remodified in order to better account for the data and thus more clearly describe the process."

Other advantages of the ethnographic method, mentioned by many of the authors already referred to, are that:

1. it allows behaviour to be recorded as it occurs, in its "natural environment";

2. it permits the recording of "the stream of behaviour" so that whole events are preserved;

3. it allows the routine of the job to be observed and recorded. This routine, which may be a key to the understanding of the essential characteristics of a situation, is often missed out by other data gathering techniques.

There are, however, a number of problems associated with the use of the ethnographic method. A number of the most crucial difficulties and decisions facing the ethnographer or field researcher are discussed in the following sections.

The Effects of the Presence of the Researcher

The ethnographer is usually forced to "tread a thin line" between over involvement and complete detachment in his research effort. His delicate position is well illustrated by the anthropologist Alan Beal (cited in Spindler, 1970, p. 4):

> Except under extraordinary circumstances, there will always be a kind of clear plastic film separating the fieldworker from the rest of the community . . . . The fieldworker who behaves like a mechanical man, who treats others as subjects, or who coldly calculates the degree of friendship to be extended in each case, is going to appear less than human . . . . Perhaps the ideal fieldworker would be a person who learned to behave in a natural and predictable manner, involved but not strongly involved.

The ethnographer's role in the research situation is, therefore, a problematic one. Because he is typically a fixture in any observational setting, his actual presence may have an impact on the behaviour being observed. If the ethnographer takes care to be unobtrusive and avoids giving the impression that judgments are being made, then his effect as a stimulus can be minimized. However, no matter what precautions the ethnographer may take, he can never be sure that his presence is not affecting the situation he is observing. Ethnographers, and indeed all field observers, would do well to remember this fact.

In this present study the researcher took a number of steps to try to minimize the effects of his presence. Because this method of data collection is so dependent on the permission, goodwill, and cooperation of each respondent, specific arrangements and conditions were established with each superintendent:

1. each superintendent involved in the study was fully informed as to the purpose of the study;
2. each superintendent was given the opportunity to check on and clarify interpretations of events made by the researcher;
3. each superintendent was guaranteed anonymity in the research report;
4. an agreement was reached with each superintendent at what stage the observer would leave a situation when it was delicate or personal in nature;
5. the researcher tried to make as few demands as possible on each cooperating superintendent. Apart from occasional exchanges for the purpose of clarification and/or interpretation, each superintendent was able to pursue his work unencumbered by the researcher's demands.

Overall, the research was conducted in as nonthreatening a manner as possible. Every attempt was made by the observer to establish a trust relationship with each superintendent observed.

Another problem related to ethnographic research, which the researcher may or may not be aware of in his own research, is generally referred to as researcher bias.

Researcher Bias

The researcher may consciously or unconsciously mould his interpretations of behaviours or events to fit his own preconceived ideas or prejudices. The notion of bias is, however, often confused with the idea that ethnographic research should not be contaminated by the resarcher's own experiences and theoretical perspectives.

The first thing that should be noted regarding the distinction between bias and subjective knowledge and experiences is that no researcher can approach research as a *tabula rasa*. Kaplan (1964, pp. 132-133) quoting the words of John Stuart Mill makes this point very forcefully. He states:

> After the moment of the observer's birth no observation can be undertaken in all innocence. We always know something already, and this knowledge is intimately involved in what we come to know next, whether by observation or in any other way.

Our observations are, therefore, always influenced by our prior conceptions: we view the world through our very own perceptual lenses. These lenses have been partly ground by our exposure to and knowledge of theoretical constructs and formulations — if such exist — related to the research problem. There is no such thing, therefore, as atheoretical research. An observation is itself purposeful behaviour in that it is the product of active choice on the part of the observer. This choice from among a plethora of alternatives is guided by how we conceptualize the research problem. Geertz (1975) suggested that theory helps the researcher construct a framework for his analysis and interpretation of events; it makes mere observation of events intelligible.

The issue is further complicated by the fact the the researcher imposes his own world view on his observations by the very language he chooses to describe them. Karl Popper (1959, p. 59) reminded us that there is no purely "phenomenal language," no language to describe something sensed and not interpreted. Fearing (1954), commenting on the ideas (related to this topic) of the anthropologist Benjamin Whorf (cited in Von Bertalanffy, 1973, p. 235) supported this argument when he stated:

> the commonly held belief that the cognitive processes of all human beings possess a logical structure which operates prior to and independently of communication through language is erroneous. It is Whorf's view that the linguistic patterns themselves determines what the individual perceives in this world and how he thinks about it.

Nietzsche's point that there is no "dogma of immaculate perception" is, therefore, well taken. The researcher is, in a sense, the slave of his own cognition. His interpretations will be coloured by his prior knowledge and experiences — his view of the world. The ethnographer, *because he is the instrument* for both data collection and interpretation, must, therefore, make explicit for his readers his own particular orientation or conceptualisation of the research. He must also endeavour to present, to the best of his ability, a fair and balanced view of the meanings of observed actions and events. He must acknowledge —if he is aware of them — any particular biases he possesses toward any of the people or occurrences in his research. More than that he cannot do!

The problem of bias is closely associated with two other problems which are particularly difficult to deal with in ethnographic research — problems of reliability and validity. These will be discussed in some detail in the following section.

Reliability and Validity of Results

The first point that should be made is that the accepted notions of reliability and validity as they apply to quantitative data can be difficult to apply to findings in ethnographic research. With regard to reliability, standardizing research procedures to meet the reliability criterion of replicability may well be in conflict with the need for flexibility and open-endedness in this type of research. However, while the use of a set of precise definitions may be restrictive in that it places brackets around data, it seems necessary to use the accepted theoretical descriptive language to facilitate communication and understanding of the results. Silverman (1972, p. 223) encourages field researchers to use the accepted descriptive language of the social sciences because everyday language has a wide variety of meanings. He suggested that if everyday meanings were used in academic discourse, they "might prevent discussion or replication of a particular work simply because colleagues might be troubled over the particular meaning implied by the vocabulary employed."

A further problem for the ethnographer is that another observer watching the same behaviours might very well produce a different kind of analysis. Inter-rater reliability tests are generally not possible for the lone observer working in the field. It is encumbent upon him, therefore, to explicate for the reader his methods and procedures of recording, coding, and analysis, so that the reader can judge for himself the appropriateness of procedures or categories employed.

Mindful of the problems involved, the researcher in this study adopted a number of measures in order to increase its reliability. First, the researcher used systematic recording and coding procedures, adapted from Mintzberg (1973). Secondly, pilot observations and interviews were conducted with two superintendents to test the appropriateness of the recording and coding techniques and the interview questions. Thirdly, the researcher defined the unit of behaviour for the study and the specific dimensions of this unit were established for recording purposes. Fourthly, through interviews and impromptu meetings, the researcher checked his interpretation of events with each superintendent. Fifthly, much of the data was generated through low inference level observations and these findings were used to test the propositions derived from the theoretical notes and the categories of purpose. Finally, in the role of observer as nonparticipant, the researcher tried to maintain objectivity and minimize bias in the interpretation of the data.

The ethnographer also has to deal with the question of the validity of his conclusions. Lutz and Iannaccone (1969, p. 124) suggested that once reliability is established, validity is not so much a question in field observations. They stated:

> As Kerlinger has said when writing about the field study method, "There is no complaint of artificiality here. "The observer is viewing the actual behavior. He is not one step away from the behavior as is the case when tests are used to measure perceptions of behavior. Rather, the field observer is looking at the actual behavior. In this method, if the data are reliable, they are usually valid.

Despite Kerlinger's reassurances, however, the issue of validity in this form of research must be addressed by the researcher. Erickson (1978, pp. 1-2) made the point clear when he suggested that, contrary to the general belief, narrative description may be low in validity. He stated:

> description is no philosopher's stone, with which in some magical alchemy, two elements — sensitive but entirely "unsystematic intuitions" . . . and the ability to write good prose — are combined to produce insights into the nature of the events described — insights which are invariably "true," or "relevant," or "useful."

Validity is, of course, concerned with the credibility of conclusions. When we ask "Are the conclusions valid?" we are essentially concerned with the "reality" from which the findings were extracted — Have we portrayed the reality in our narrative description? Validity from this perspective is essentially concerned with *truth* conditions, with the judgment that the results seem to fit the reality. The degree of match between the reality and the representation of it presented by the researcher is generally referred to as *face* validity.

The credibility aspect of this form of research is concerned mainly with the need for the researcher to present a solid package of evidence to support his conclusions. It is, however, not always easy to summarize qualitative data and present it in such a neat package. Because such qualitative evidence often is comprised of written field notes, video recordings, anecdotal remarks, and other such bulky data, it may be too cumbersome and disruptive of the flow of argument to present evidence supporting each conclusion. The ethnographer, therefore, tends to resort to presenting a series of characteristic illustrations from various sources to support his conclusions. Glaser and Strauss (1968, p. 229) provide us with a good description of how the ethnographer conveys credibility to his readers:

> So the researcher also ordinarily utilises several of a considerable armamentarium of standard devices. He can quote directly from interviews or conversations that he has overheard. He can include dramatic segments of his on-the-spot field notes. He can quote telling phrases dropped by informants. He can summarize events or persons by constructing readable case studies. He can try his hand at describing events and acts; and often he will give at least background descriptions of places and spaces.

Because validity is so closely related to interpretation — the more the burden of interpretation assumed by the researcher the greater the likelihood of developing invalid conclusions — the researcher must make explicit both the processes and the evidence used in arriving at his conclusions. There is one cardinal rule that the ethnographer must adhere to: *Whenever he feels unsure about an interpretation, or foresees that his readers may be uncertain, he should state explicitly the evidence upon which he is basing his interpretation.*

One final point should be made concerning the credibility of interpretations and conclusions. Geertz (1975, pp. 17-18) warns that "coherence" of argument cannot be the major test of validity in ethnographic research. He points out that "there is nothing so coherent as a paranoid's delusion or a swindler's story." Our interpretations cannot, therefore, depend only on the tightness with which they hold together, on the style of presentation or the logic or plausibility of the argument supporting them. Neither can they depend entirely on the richness of the description. Such description could constitute on the part of the ethnographer an attempt to "dress up" the data and provide them with a substance and robustness that they do not possess. The message then is that the reader of ethnographic reports must be on guard. Part of the responsibility for testing the validity of conclusions rests heavily on his shoulders. Just because an account of behaviours or events seems plausible is no guarantee that it represents the reality from which it has, supposedly, been taken.

The researcher in this study was always conscious of his responsibility to generate valid conclusions. The reliability measures described earlier were adopted in part to help the researcher arrive at valid interpretations of observed behaviours and events. In addition, the development of theoretical notes, as described earlier, provided the researcher with the opportunity to check and recheck his conclusions and interpretations. The researcher also tried to minimize the effects of his presence as much as possible. Conclusions and propositions were reached through a process of what McCutcheon (1978, p. 12) referred to as "structured corroboration." She suggested that, using this process, "many facts are shown to support one another in agreement about a particular conclusion. A fabric of interrelated facts, anecdotes, quotes and other bits of information is woven." This use of many items of evidence, together with a wide range of evidence, allowed for interpretations to be made with a greater degree of confidence.

One final problem related to ethnographic studies is worthy of note. This is the accusation by many who are critical of its approach, that it is impossible to generalize from its results.

Generalizing from the Results

The rules governing generalizability in the logico-deductive tradition are not really applicable to this form of research. First, because the purpose of the research is usually to generate an in-depth analysis of a situation or event, the sample chosen — and it is not really regarded as a sample — is often small, perhaps one case only. In addition, the use of random samples is generally not appropriate. The point being made is that different rules apply to this form of research. To talk about representativeness of sample, or size of sample is to subject it to a set of research values that do not apply. In other words, to speak of a case study as constituting an N of 1 is meaningless. Geertz (1975, pp. 25-26) in discussing the ethnographer's responsibility for generalizing, suggests that what generality he contrives to achieve "grows out of the delicacy of . . . distinctions, not the sweep of. . . abstractions." The essential task of the ethnographer, therefore, is not to answer the reader's questions but to make available to him answers derived from an interpretation of the behaviour of others in similar situations.

Conclusions

I now wish to pick up the theme included in the title of this paper and addressed briefly in an earlier section — that ethnography is an *adventure* in interpretive research. It should now be apparent to the reader that ethnography is, as Geertz has stated, "a venture in interpretive research." Why view it then as *adventure*? The author proposes that it is indeed a type of adventure — a safari into the jungles of social meanings. There are a number of reasons which come readily to mind that qualify such a method as an adventure.

First, the ethnographer frequently steps into the *unknown*. Thick description is actually an attempt to map uncharted areas full of rich meanings which are waiting to be discovered.

Secondly, it is an *exciting* form of research, as any adventure should be. The researcher is constantly alert, full of anticipation, wondering what will turn up next.

Thirdly, it is an *exploration*. The nooks and crannies of each phenomenon, event, and experience have to be explored. New meanings are discovered and kept for a more detailed examination in the light of unfolding events.

Fourthly, it is an adventure because it presents a challenge to the researcher, who has to make sense of the multiple realities he observes. This is no easy task.

Fifthly, there are numerous pitfalls into which the unsuspecting researcher can plunge. The ethnographer can easily lose his direction in the amorphous mass of observations confronting him. He can also take the wrong direction in his attempts to derive meaningful inferences from his data, and thereby generate invalid conclusions.

Finally, the ethnographer has to perform a very demanding and rigorous task. Those who criticize this form of research because it generates "only soft data" and who intimate that such research requires less expertise than "real" empirical research have an unfounded argument. The ethnographer, in fact, has to wear a number of hats. He has to be part historian, part psychologist, part sociologist, and part anthropologist. He is of course no less a scientist than his colleagues conducting empirical research, because he must apply rigorous and consistent rules and procedures to the various steps in his research effort in order to arrive at reliable and valid conclusions.

Overall, then, the ethnographer faces an exciting and challenging undertaking. He encounters many problems, but with careful preparation and an intimate knowledge of the strengths and weaknesses of this form of research, he has a useful contribution to make in illuminating theory and practice in his field of endeavour.

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BOOK REVIEWS

RUTLAND STREET: THE STORY OF AN EDUCATIONAL EXPERIMENT FOR DISADVANTAGED CHILDREN IN DUBLIN. *By Seamas Holland.* The Hague: Bernard van Leer Foundation; Oxford: Pergamon Press; 1979, xv, 112 pp. ISBN 0-08-024264-2

The Irish Department of Education and the Bernard van Leer Foundation at the Hague cooperated in setting up an educational experiment for disadvantaged children in Dublin in 1969. This book includes descriptions of the location selected for the experiment, planning of the project, background implementation of the educational programme, and community and home programmes developed. The design of the project and its findings are evaluated here together with short chapters on the reactions of parents and outcomes of the project.

Disadvantaged children are defined in this book as those who, because of sociocultural factors, have limited knowledge and skills which, combined with particular attitudes, may result in adjustment problems on entering school and in learning difficulties in school. The characteristics of the area served by Rutland Street School, the school built for this experiment, include "high unemployment, large families, inadequate living accommodations, early marriage, marital disharmony amounting at times to ill-treatment and desertion, inability to match resources to needs, chronic ill health, inadequate knowledge of developmental needs of children, and a lack of understanding of the purpose of school" (p. 12).

The developers of the educational programmes for this pre-school centre were cognizant of the assumptions, strengths and weaknesses of the American head start project, of Basil Bernstein's work on the theory of restricted and elaborated linguistic codes, of the preschool playground movement in New Zealand, and of the preschool education approach in the British nursery school. Among other things relating to cognitive development and social maturation, it was decided that "language should be at the heart of the curriculum" (p. 29) and that the instructional objectives were to be in terms of pupil behaviour.

The community programme included strategies such as Mothers' Club, Advice Centre, informal visits by parents to the school, and formal meetings of teachers and parents. Concern for the importance of home environment in the social and psychological developments of children, particularly during the early years, resulted in the organization and implementation of a home programme. One dimension of this programme was to have mothers attend school "for one hour per week to work through a prepared lesson with their children under the supervision of one of the social workers" (p. 58). Another part of this programme, one more integrated with the educational experiment, was to attempt to change the home conditions of the disadvantaged children mainly by attempting to change the teaching style of the mothers. This involved teachers visiting the home and

teaching lessons in this setting. The Rutland Street School received international attention because it was the first European project to use home teaching as an intervention procedure to help disadvantaged children. The success of the initial programmes in this regard was such that it gave encouragement to embark on other similar programmes. However, the conclusion was that in order to achieve "significant results, programmes (of this kind) may have to be accompanied by effective action to ameliorate the harsh and unstimulating environmental conditions which seem to frustrate the best efforts of disadvantaged parents to establish satisfactory relationships with their children" (p. 64).

The design of this project included a control group of "non-disadvantaged" children. The findings as outlined by Holland include the fact that the average IQ score had an initial gain and then a progressive decline. However, there was a tendency for less bright children to maintain or improve their position. There were also gains in performances on a test designed to measure achievement in areas regarded as necessary for success in school, but the experimental group and the control group had the same English reading quotients.

Holland combines impressions gained from day-to-day interactions with parents and the results of an "objective survey" to indicate the positive reactions of parents to the project. It was found that mothers' attitudes toward the children changed and they became more active in the educational process of their children. The outcomes of the project as presented in this book include a couple of other studies which were done in other cities in Ireland, the development of teaching strategies to engage children's interest, and the development of an appropriate curriculum. Since the experiment was over, in 1974, summer courses involving parents have been offered for teachers in disadvantaged areas.

Aside from the descriptions contained in this book, the author touches on (ch. 12) some of the basic sociological assumptions in deciding to develop plans for intervening into the home lives of young children in order to improve their chances of becoming successful in school. Some may argue that there is need to change the societal system so that there will be a widening of the range of options open to the disadvantaged, while others see the greater need as one of educating people out of their poverty. On another vein of thought, the issue of measuring success is pointed to. "While the measured effects of the project failed to show marked improvement in the scholastic performance of the children, there are, nevertheless, some indications that the overall approach has much to recommend it" (p. 100). These indications are improvements in student attitudes and in the social atmosphere of the school, and increases in student willingness to learn and in parental awareness of the purpose of schooling.

This is a useful little book. For those involved in planning intervention projects, it is a useful description of the complexities of the organization, implementation and assessment of such projects. On a more theoretical level, it could help one grapple with the assumptions often made concerning the sociocultural environments of the disadvantaged, their *abilities* to learn, and the well entrenched tenets of teaching. The biggest weakness of this book is one of omission. Specifically, except for a few brief references to parents (pp. 83-87), children (pp. 100-101), and social workers (pp. 49-53), we learn little of the experiences of the teachers, pupils, and parents who participated in this experiment. This omission is serious, because the author suggests that the success of the project lies in these experiences and resultant behaviours, and is not indicated in traditional IQ and academic performance benchmarks.

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INTELLIGENCE: AN INTRODUCTION. *By David W. Pyle.* London: Routledge and Kegan Paul, 1979, 123 pp., $10.50.

This small book, of some 100 pages, is by a lecturer in an English college of education and is for "all those who are educationally concerned with developing abilities in children . . . who find more advanced texts difficult to read". Thus it arouses interest for possible use in initial teacher-training in Canada. In 1979, two important books on Intelligence were published, one by P. E. Vernon and the other by H. J. Eysenck. They are, in their different ways, written with rare clarity and scholarship; they too are aimed at non-specialists. Even so, I find I can only prescribe them for my graduate classes; undergraduates in education can get a great deal out of them in time, if they are given a lot of help, but unfortunately, with their limited background and the pressures of their curriculum there is not the time. Hence the interest in Pyle's new book.

The titles of the five chapters are predictable. The first asks, "What is Intelligence?", the second, "Can it be measured?" The next two deal with nature-nurture and development while the last is headed "Intelligence and Learning." The layout is traditional, no tricolour printing, no pictures, cartoons, or other "aids to learning." It requires of the reader about the level of general literacy and reasoning power of a somewhat above-average arts graduate. It was found very demanding for first year education students; in fact, much of Vernon's book, which has the advantage of the meticulous and complete coverage of the literature so characteristic of his work, was no more difficult for them.

Although the chapter titles of Pyle's book appear familiar, the approach is not. Strongly influenced by information theory, there is much less concern than usual over individual differences of genetic origin and some undue optimism for the teacher's potential to improve children's intellectual powers. The definition of intelligence, reminiscent of people like Lloyd Humphreys, includes the whole repertory of learned skills, knowledge, processes, learning sets and so on which are acquired throughout life. The emphasis is on the development of learned strategies of thinking with the promise that, in spite of Coleman, performance contracting, Collins and Headstart, we may "start to make educational systems more effective, and improve the efficiency of children's brains and their learning" (p. 69). The stance is thus at the other end of a continuum starting with Ertl's speed of response of electric potentials and Jensen's choice-reaction times. Intelligence tests, IQ, and age norms are denigrated; criterion referenced testing and mastery learning are approved.

In spite of this, there is a brief survey of the contributions of Galton, Spearman, Burt, Thurstone, Guilford,and so on,but the sheer concentration of the material makes comprehension difficult for those who are meeting concepts for the first time. On the relative contribution of genetics and environment, a moderate, wholly acceptable position is stated, e.g., "both genetic factors and environmental factors are crucial," but then the genetic contribution tends to be ignored. The Lesser, Fifer and Clark (1965) results, for example, are quoted insofar as ethnic group, social class and patterns of ability are concerned, but the marked ethnic differences in overall ability are omitted. Then the conclusion, "This amply demonstrates the effect which culture can exercise on the mental abilities of children" does not follow from "within each group the middle class children tended to have similar patterns only higher scores all round" (p. 57). Genetic influences were also there. Similarly, it is rightly claimed that low maternal IQ is a strong predictor of low functioning in a child, but it does not follow that the cause is only lack of stimulation and verbal encouragement at home. And the finding

that first-born children have higher IQs is presented as an environmental effect, ignoring Schooler's suggestion that it may well be a statistical artefact.

One-sided selection of evidence also mars other parts of the book, e.g., "many would accept the validity of the principle behind the findings" of the Rosenthal and Jacobson (1968) study. This, in spite of the admittance that the work was flawed. Too much weight is sometimes given to lightweight authors, e.g., Holt, and serious criticism of the positions held in the book is passed over. This is a pity because there is a lot here which is well written and provocative of serious thought. I myself would not wish to prescribe the book for use by students in education except, perhaps, for critical evaluation by PhD candidates with a good background in psychology.

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LABOURING CHILDREN: BRITISH IMMIGRANT APPRENTICES TO CANADA, 1869-1924. *By Joy Parr.* London: Croom Helm; Montreal: McGill-Queen's University Press; 1980, 181 pp., $25.95

Since Neil Sutherland's *Children in English-Canadian Society* (1976), students of the history of Canadian childhood have eagerly awaited this first major study of British child emigration to Canada. Partially based on Parr's unpublished 1977 Yale University dissertation, this monograph demonstrates the application of new methods and analyses to Canadian social history. The heart of *Labouring Children* is a sample of 997 children and youths emigrated to Canada by Dr. Barnardo's Homes from 1882 to 1902. The sample was developed by selecting every twentieth juvenile on the Barnardo's sailing party lists, which included both Barnardo wards and children seconded by Poor Law Guardians for emigration. Dossiers containing relevant data were compiled for sample members before Parr developed a codebook with 52 variables, which allowed for computer-assisted analysis of the data.

In addition to this quantitative data, traditional research methods were used to examine historical records and manuscript collections of emigration homes and public archives and in the analysis of relevant published primary and secondary sources.

In four condensed chapters, Parr describes the conditions of British children most likely to be admitted to British rescue homes, the ideologies and practices of evangelical child savers, the children's initial reception in Canada from 1869 to 1900, and the social and moral consequences of emigration societies' policy that separated children from parents, relatives, and friends.

The next three chapters reconstruct the life cycle of child immigrants in Canada from apprenticeship or adoption to household membership and finally to adulthood and independence. Data gathered by traditional research methods are woven into the results of quantitative analysis to provide a collective biography of

the approximately 80 000 "home children" who settled in Canada between 1869 and 1924. While much of the reconstruction of the rhythm and routine of rural Canada is unremarkable, some conclusions stand out. First, Parr's judgment that the indenture system — especially if there were support payments for children 6 to 10 years old — "did more to define the rights of British immigrant children than to extinguish their rights" (p. 84) demonstrates, at least in the case of Barnardo's and the Catholic agencies, the pragmatic genius of the child-rescue societies. Secondly, adjustment problems were often related to the discrepancy between the relatively pleasant life of the British children's institutions and the isolation, social distance, and harshness of Canadian rural life (pp. 101-103). Thirdly, Parr establishes that the movement of children from one situation to another — particularly in the case of boys — was often related to the necessity of matching the children's economic value to land productivity. Boys, and girls less so, moved from least to most productivity agricultural lands as they progressed from being boarded out to earning their subsistence and schooling by helping with farm work to earning wages as farm hands (pp. 86-89).

Despite Parr's impressive research and the significance of juvenile emigration in understanding the development of Canadian social policies and practices in the twentieth century, the book is disappointing in its scope and insight. The dates in the subtitle are deceptive in that the developments after 1900 are not adequately analyzed, with only the short eighth chapter devoted to the twentieth century.

Given Parr's emphasis on evangelicals and their societies, one is disappointed by simplistic descriptions of their motivation and theology (pp. 35-37). Moreover, by curiously restricting "evangelical" to British Quakers and Plymouth Brethren, Parr distorts the concept so as to exclude members of other Christian communities (p. 105). Finally the literature on the British evangelical movement suggests that it is a major error to assume that the intensity of religious commitment and activity remains constant over one's life, which Parr is inclined to do in reference to child savers such as Thomas Barnardo (p. 142).

In a treatise filled with statistics, there is no clear breakdown of the age at emigration for the 997 children in Parr's sample. This is a significant point because both contemporary observers and Parr criticized the practice of separating young children from family, friends, and homeland, and emigrating youths before they had reached the age of legal consent (p. 11). Were the vast majority of juvenile emigrants between 1869 and 1908 children, i.e., under twelve? Parr claims that the issue of child emigration was settled in March 1925 with Dominion ban on the movement of children under fourteen years of age which became permanent in 1928 and that "the boys and girls who came to Canada through the 1920s and 1930s were teenagers searching for their first paid jobs who had completed their schooling and made their own decisions to leave home and family and begin a new life abroad" (p. 153). Such a statement is anomalous since in the four years, 1920-23, excluding emigration under the Empire Settlement Act, 5 100 children were sent to Canada. Are we to understand these "children" to be the teenagers of the 1920s and 30s? It would also seem that 5 000 out of the 80 000 estimate of emigration is not a trivial number.

The problem of age at emigration also relates to three other issues. First, little children of ten years and under appeared as often claimed by emigration societies to have made a better adjustment to Canadian life than did adolescents (pp. 109 and 115). Secondly, labour groups such as the Trades and Labour Congress opposed the movement not only because of potential urban drift as apprentices completed their indentures, but because many "children" were old enough to compete immediately with Canadian labour (p. 54). Thirdly, because Parr hails

the end of child emigration in 1925 and comments favourably on the fortunes of Barnardo immigrants in the 1920s who "were not typical child immigrants" (p. 124), we need to know in detail the age composition of all children from 1868 to 1924 and not a truncated Barnardo sample of 1882 to 1908.

Parr's favourable assessment of the 1920s emigration (the 1930s hardly count since the depression destroyed most of the demand from any kind of farm labour as well as opportunities for land ownership) is curious in that the most carefully orchestrated campaign of vilification of the emigration societies *and their wards* occurred in the 1920s and set the stage for the much admired ban on the under fourteen-year-olds. The remarkable aspect of the antijuvenile immigration campaign led by Charlotte Whitton and Canadian Council on Child Welfare was the crude mixture of solicitude for the circumstances of the children and unrelieved efforts to establish their degenerate hereditary traits and moral failings. Indeed, Parr's unwillingness to confront adequately not the harsh treatment meted out to child immigrants by Canadian masters and mistresses or the severe emotional burdens of isolation and impermanence of placements *but* their persistent characterization as the offspring of the degenerate classes of British society is one of the study's major flaws. Duly accepting Canadian complaints about the prevalence of enuresis, masturbation, and illegitimacy, Parr provides us with a detailed analysis of the medical history of the offenders (pp. 103-105 and 115-117) *but* no analysis of the class and social thought that gave rise to the obsession.

A second major flaw is that the study is whig history dressed up like revisionism. We are treated to some tantalizing hints that the "history [of the child emigrants] does reveal a darker side of evangelicalism, of turn-of-the-century childhood, and of Canadian rural life than the record has so far been allowed to express" and that the apprentices "certainly were over-worked, harshly treated and little more influenced by common school and child protection movements in 1924 than in 1870" (p. 12). By the time Parr reaches the end of her discussion of the apprentices' experience, she concludes that "the child immigrants were materially better off in Canada than they would have been in Britain" and that "the gains are clear, whether or not they compensated for the hardships entailed in early emigration. They were, however, far smaller than the reformers had predicted" (pp. 138-139). Rather than a dark tale, Parr provides us with an abstract story of the transformation of the concepts and practices in child welfare that put an end to the child emigration movement.

On the Canadian side, the early critics of the movement, i.e., county sheriffs and gaolers, country doctors, Dominion members of Parliament, the Dominion Trades and Labour Congress, and urban middle-class reformers, had not only failed to generate the debate needed to improve substantially the conditions of the children but had instead "heightened the tensions of the apprenticeship years and left home children with a heavier burden to carry" (pp. 57-58). It is disappointing to note Parr's bland description of the statements by these critics as "a heavier burden" when they characterized the children as having "syphilitic tendencies," as being "imbued with crime since infancy," part of Britain's "undesirable population," and carriers of "evil habits" (pp. 54-57). Similar sporadic criticisms by the Local Government Board, Boards of Guardians, and others evoked palliatives on the part of Canadian authorities (pp. 34, 51-52, and 145). But like Whig versions of common schooling, the notion of a true childhood for all children was an idea whose time would finally come in the twentieth century!

Moreover Parr argues that the growing political power of British labour cast child emigration in a new ideological light which culminated in the Bondfield Report of 1924 (pp. 145-147 and 153), while on the Canadian side, the standards of child welfare for *Canadian* wards had far outstripped the best efforts of the emigration societies (p. 150). Thus, she continues, by the 1920s, the scientific and professional interests had coincided with the advanced political and social views of British socialists (p. 153). The coincidence of interests and views, by bringing an end to child emigration in 1925, ensured that all children would have a childhood (p. 12).

Rather than a tale of advanced social ideas whose time had come, the history of child emigration is a complex story of human misery, religious philanthropy, imperial ideologies, human greed, and heartless and professional ambition. Of these we hear almost nothing in Parr's antiseptic account of the Canadian side of the Home Children. Hopefully their ordeal will be told elsewhere.

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TEACHER DECISION-MAKING IN THE CLASSROOM. *Edited by John Eggleston.* London: Routledge & Kegan Paul, 1979, 234 pp.

This collection of papers, revised versions of those prepared by members of a working group of the Social Science Research Council, bears all the hallmarks of a set of conference papers. Each presents a particular view on the common theme, the process of teacher decision-making, with the editorial introduction attempting little more than a lively account of the role of the classroom teacher, the findings of the most pertinent recent research, and the particular aspects of the problem the individual writers have tackled. Having made that point, it is necessary to add that few working groups could be counted on to produce a set of papers as carefully argued and as calculated to encourage and direct further research. Moreover, few would evidence such a general concern that classroom teachers themselves should be drawn into this kind of research and that their suggestions and objections should be taken seriously, not dismissed as further evidence of the conservatism of an allegedly conservative profession.

The emphasis is on empirical research, based on an examination of the context in which teachers make their decisions. The most thorough-going attempt at clarifying "the nature and incidence of decisions and the complete network of variables that surrounds them" is that of Sutcliffe and Whitfield, who set the tone of the volume by their insistence on the need for a definition of decision-making that is "logically consistent, empirically testable and empirically justifiable." Their stance is ably defended, but it seems a little odd that in their consideration of teaching, consideration of the (at least) complementary activity of learning is set aside, as becoming relevant only when the "quality" of teaching is being examined. Admittedly, the plethora of variables makes any research into teacher-pupil reaction fiendishly difficult and Sutcliffe and Whitfield are to be commended for the very precise delineation of the area of their investigation. Nevertheless, as

they themselves point out, any research in the field of teacher-pupil interaction is influenced, however subtly, by the researcher's notions of effective and desirable teacher behaviour. That being so, it is a pity that the case for regarding learning as a central characteristic of that particular form of interaction called teaching was not examined in detail. The disappointment is all the greater because the analytical introduction to their account of their research project is both fully developed and an integral part of the argument, taken as whole. (In contrast, Bellaby's important, provocative paper, "Towards a political economy of decision-making in the classroom," seems somewhat contrived, the theoretical statement of the introduction being linked rather awkwardly with an account of painstaking research which could almost have been presented independently of the preceding section, were it not that the alternatives presented in the conclusion presuppose acceptance by the reader of the position taken in that preliminary exposition.) This paper by Sutcliffe and Whitfield is also noteworthy for the thoroughness with which the research methodology is explained and the attention of other workers is drawn to the many fruitful if complex areas that demand further investigation. Anyone interested in either teacher training or research into aspects of classroom teaching would find this paper valuable.

Another particularly interesting paper is that of Finlayson and Quirk. Although their study of the social processes affecting both teachers and those who try to influence them necessarily draws on English examples, their argument is equally pertinent in other contexts. Neither the confusion of slogans with programmes and of both with the justification of particular aims, patterns of school organization, or methods of teaching, nor the sense of failure that saps the energy and self-confidence of trainee teachers (and, at times of dramatic change in curriculum or methods of teaching, that of many experienced teachers also) is restricted to English experience. And the case made by Finlayson and Quirk for attributing part at least of the individual teacher's disquiet to unsuccessful attempts to cope with a growing number of vaguely stated and sometimes conflicting role expectations is most convincing. The problem tackled by Finlayson and Quirk is given a further dimension by David Hargreaves' stress, in his paper, "A phenomenological approach to classroom decision-making," on the extent to which teachers' handling of day-to-day decisions reflects not only their teaching style and ideological commitment (in the professional area) but also the whole range of their social values. Just how values are related to classroom practice is, of course, far from clear; perhaps, as Hargreaves suggests, an exploration of decision-making in the classroom situation will help to clarify and explain the nature of that relationship. Certainly if we could see "how values are embedded in practice" we might be able to help both beginners and experienced teachers to understand better their own practice. Various other papers suggest ways in which that examination could gain a new perspective: Keith Drake uses the economic model of choice to stress the need to remember the benefits renounced by the decision-maker at the moment of choice and hence the desirability of estimating the cost of any extra commitments in terms of renounced benefits; i.e., the benefits which could be expected to accrue from an alternative use of those resources. This underlines a point made earlier by Finlayson and Quirk; namely, that teachers cannot devote time and attention to additional tasks or additional time and attention to some existing task or tasks without sacrificing some possible other valuable activity. Drake pursues this theme, stressing the number of goals pursued concurrently by the teacher and the ways in which resources have to be distributed between them. Without denying the importance of the unconscious influences on decision-making stressed by Sutcliffe and Whitfield and, from a

different viewpoint, by Bellaby, Drake stresses the importance of the chooser's perception of the context of his choosing and the consequent need for further study of the ways in which teachers decide what possibilities are open to them in a given context, evaluate those options and decide between them. Drake's view of the teacher as chooser frees the teacher from the deterministic model of neoclassical economics and leads Drake to the view that research methodology modelled on that of the natural sciences is unlikely to give sufficient recognition to the particularity and subjectivity of many classroom decisions.

The more specific papers which are placed towards the end of this volume lose nothing by the careful limiting of their scope. Though varied in the stand-points from which they are written, they all demonstrate that aspects of teachers' decision-making can even now be studied, that teachers' perceptions of the classroom situation can be modified, and that the opportunity therefore exists to reduce the gap between what teachers seek to do and what in practice takes place.

In summary, the papers in this volume show the scope of the problem — how teachers cope with the multifarious decisions of the classroom — examine it in the light of different and sometimes conflicting viewpoints, indicate fertile areas for further research, and show that even the most radical interpretation of our society leaves some room for effective individual action by the teachers. There is some repetition, and a more sustained attempt to identify and evaluate competing accounts of the nature of the problem would have been welcome; nevertheless, the collection as a whole is a valuable account of a concerted, first attack on a rich and complex area for research.

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